MOTOR AGE

Vol. XXIX
No. 12

CHICAGO, MARCH 23, 1916

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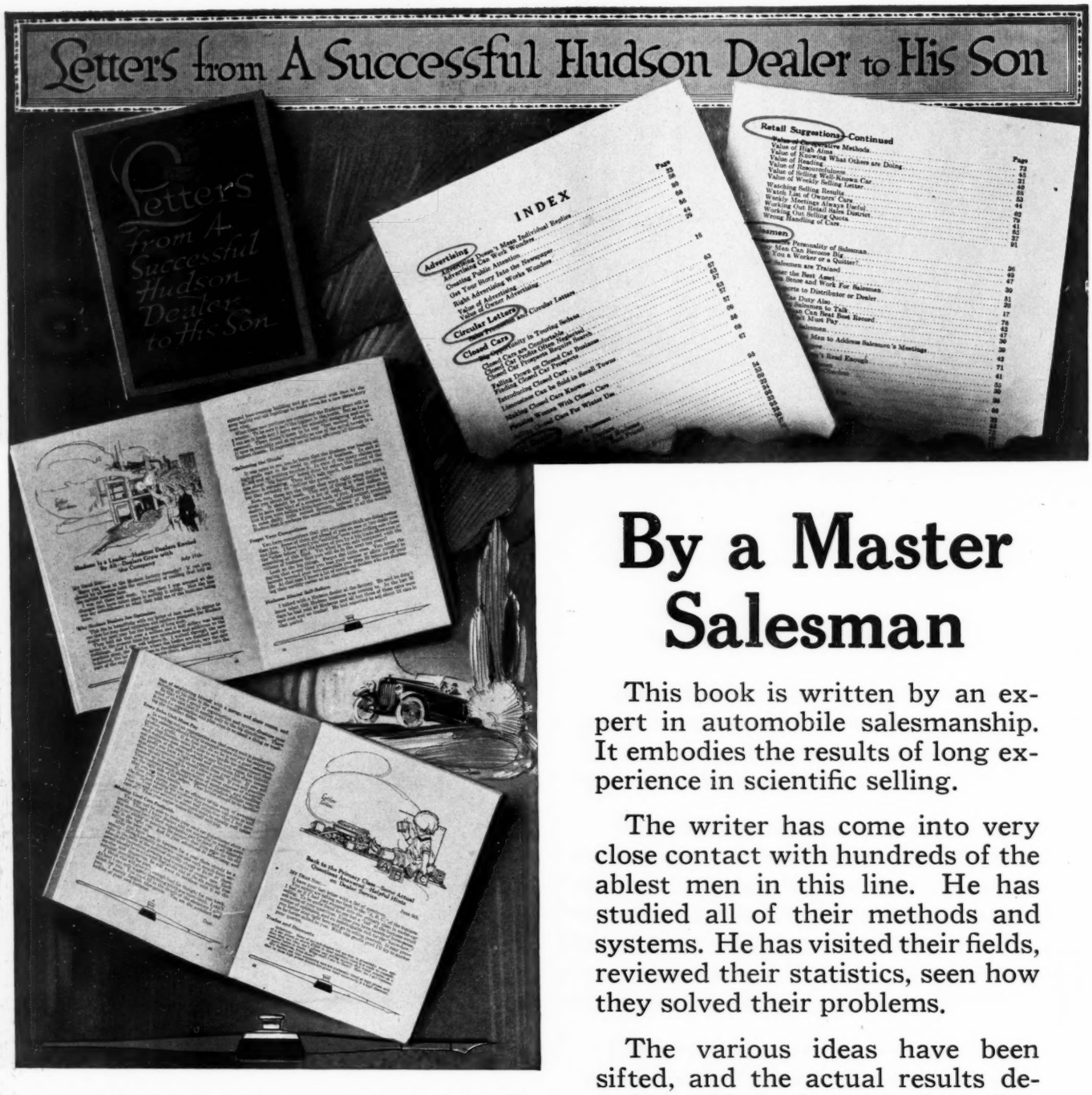
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—NEXT WEEK—

Whether you have had your car in service all winter or have had it in dry dock during the cold weather, there are certain things that should be done to it in preparation for spring and summer driving. What these are and how they are done is told in an interesting way in the feature article of the issue of Motor Age for March 30—Also the latest reports of military motors on the Mexican border and the European trenches from our special war correspondents at the front.

TIRE SERIES

Beginning with the April 6th issue, MOTOR AGE will publish a series of tire articles extending over the months of April and May.

These articles are intended primarily for the car owner and will tell him how he can increase the mileage of his tires.

The cause of tire destruction by heat will constitute one article of the series. Moisture entering the tire carcass through cuts in the surface is one of the great destroyers of tires. This will be the subject of one of the series.

One article of the series will be devoted exclusively to advice from tire manufacturers to car owners on how to get greater mileage from their tires.

Be Your Own Tire Repairman

Thousands of car owners include a small portable vulcanizer as part of their touring equipment. One of the articles will tell how to do your own tube and casing repairing, so as to take care of emergency conditions.

Readers are invited to express their opinions on various suggestions arising out of this series and to contribute their advice on the question of tires.

Every reader driving a car has his or her experiences on how a thousand miles has been cut off the life of a tire by some carelessness. These readers can perhaps tell how a thousand miles can be added to the life of a tire by giving it human attention.

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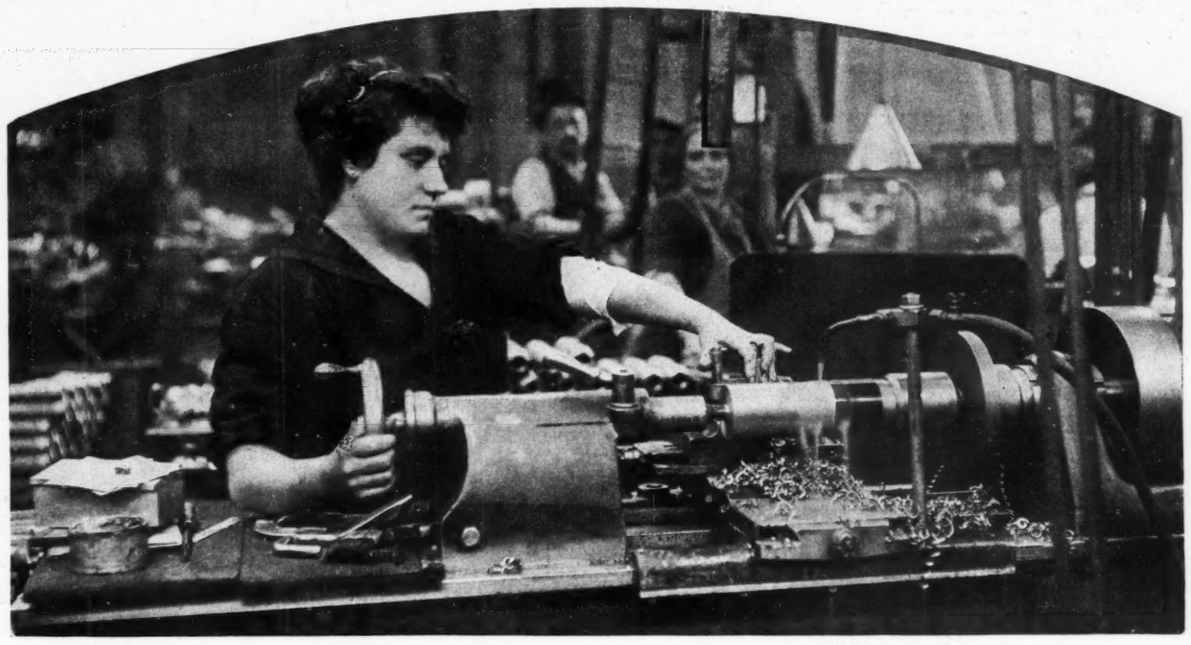
Vol. XXIX, No. 12 Chicago, March 23, 1916 $3.00 Per Year

MOTOR AGE

Amazons Man Motor Car Factories in France



French woman operating a lathe in the Panhard-Levassor motor car factory

Plants Are Being Pushed to the Limit and the So-Called Weaker Sex Proves Phrase Erroneous by Taking Mechanics' Places in Motor Car Shops Making Projectiles for Use at the Front

THE feverish pulse of those industries in England and France which have been urged to the utmost in production by war contracts, or their factories and shops diverted to the manufacture of war materials and munitions, can be felt at its height in the motor car industry. Not the least of the legions of those who are waging the fight for the allies is that body of mechanics in the motor car factories, whose leaders are the masters of the engineering world. Machines are kept running at their maximum. More than this, the maximum has been pushed beyond its old mark in some instances.

Women on the Benches

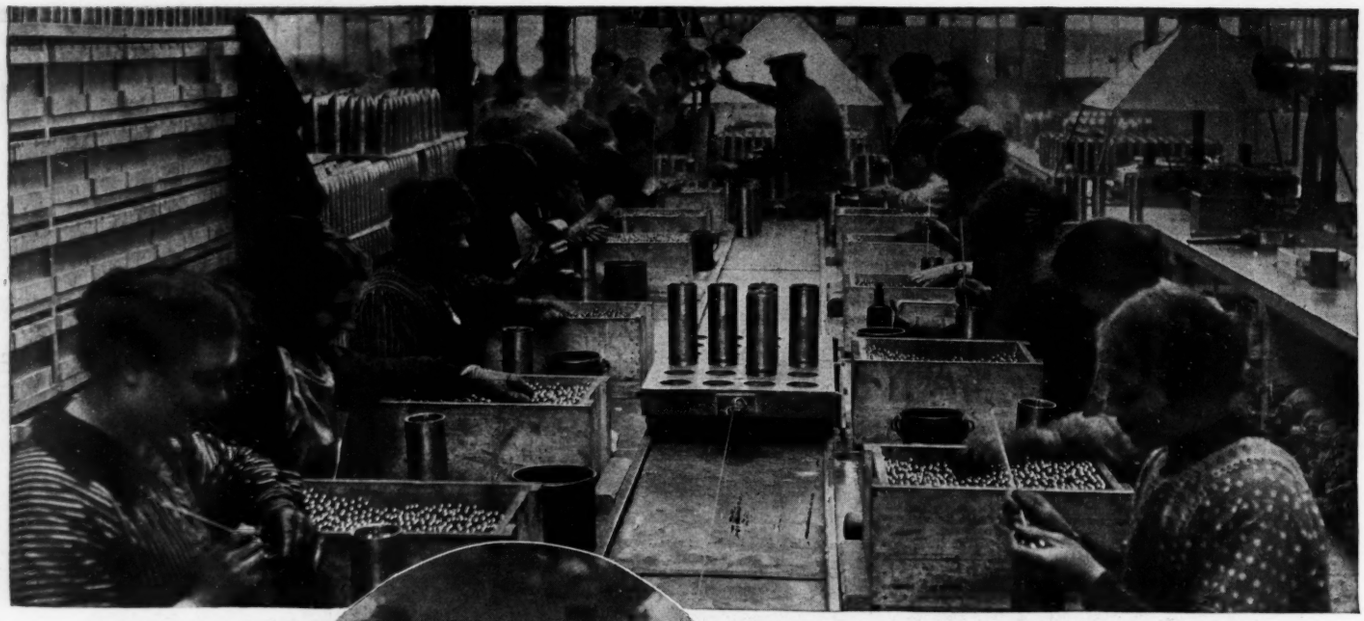
Women are everywhere at the benches, at the machines, at the lathes and presses. Machines which men operated prior to the war, it is discovered now, turned out less work then than they do at present, under the hands of women. This is partly the result of the speeding-up process. Often it is because the men kept the output of the machine lower than its maximum in order that they themselves would not be pushed too hard.

A substantial French woman making pills for the Germans

Women drivers test the trucks, ambulances and motor transports which emerge from the factory doors of those establishments where motor vehicles are still being built; elsewhere, in the motor car factories which have been put to use for making shells and munitions, both women and small girls do a great proportion of the work. A few makers are building a limited number of passenger cars, but not many. The motor car industry is in a state of confusion, and the manufacturers survey the situation with varying degrees of optimism or pessimism, very much according to how each has fared during the war.

A Terse Reply

Asking how the British motor car industry stood at the present time, one of the leading manufacturers re-



Women making shells at a French motor car factory. They have become very expert in the making of ammunition

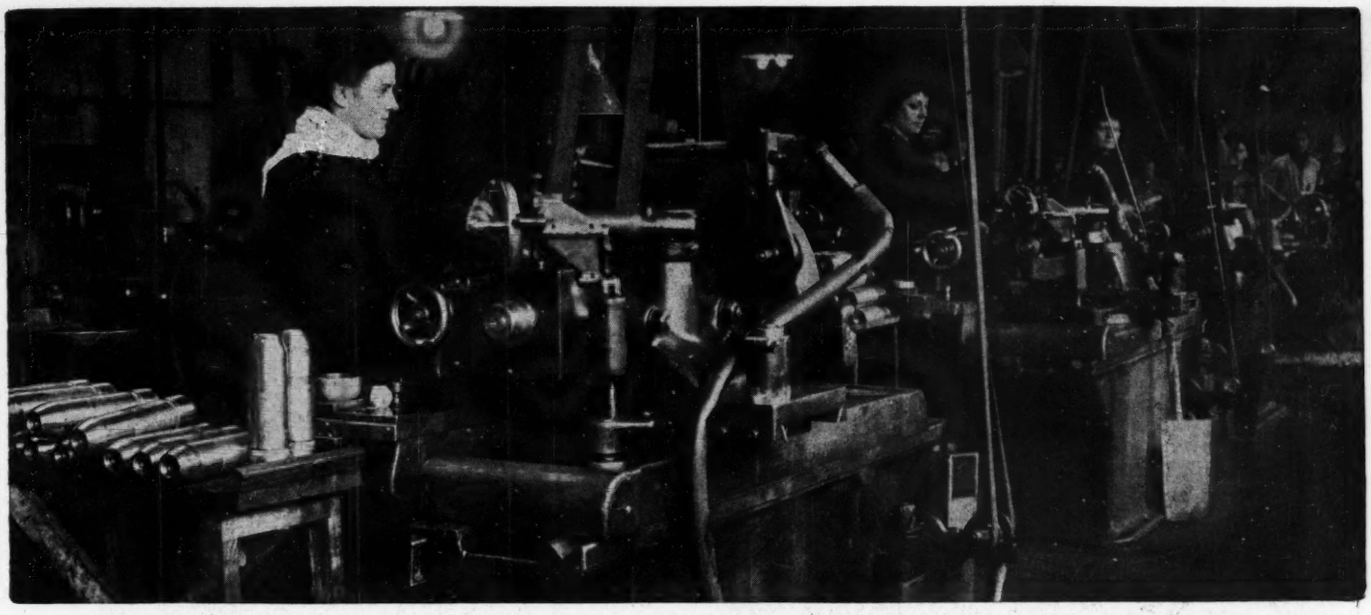
Assembling and testing time fuses in French factory

In circle—Filling shrapnel shells in French factory

Left—Woman fitting wood stopper into mouth of shells

Gauging shell parts at Panhard-Levassor factory

A department in Panhard-Levassor factory where shells are turned out by the French women



Another view taken in Panhard-Levassor plant, showing women running all machines

plied: "There ain't any British motor industry now—that's all there is to say." It was the same maker who, when asked by King George, during an official visit, how the war had affected them, replied: "It has given us Hell."

In the same town, not more than a mile away, another motor car manufacturer said, "Come and see." And he took me through shops with not a square inch of waste space in them; he showed me women and girls making hand grenades and encouraged to maximum output by means of intelligently distributed premiums; he took a pride in pointing out a score of contrivances to simplify operations and adapt existing machinery to special munition work; he showed how, by an intelligent system, he was able to secure material and was able to keep his car section running on a reduced scale while making bigger deliveries of war material than the army had estimated his factory could produce.

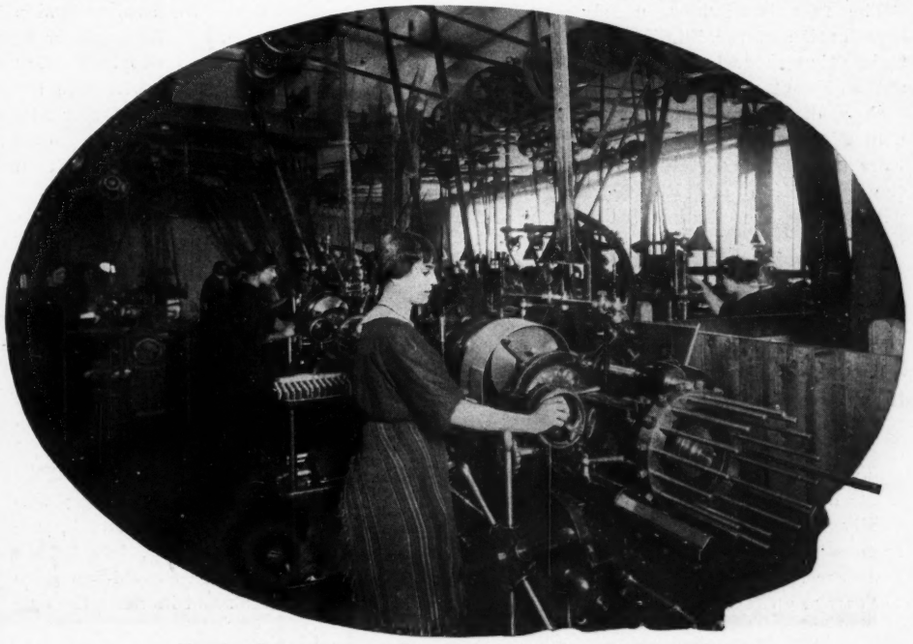
Prohibit Car Importation After War?

Another manufacturer's leading hope was that the government would prohibit the importation of motor cars for 2 years after the war. A fourth was of the opinion that if England could not compete with foreign nations without protection there was something wrong with her system. He also pointed out that the American car, by coming in when the British manufacturers were unable to supply cars, had saved hundreds of motor car agents from financial disaster.

These examples have been given to show the varied viewpoints of the British motor car manufacturers. Go into one factory and there is dark pessimism; go into another and it is to find buoyant optimism; in a third the outstanding feature is jealousy that a rival should have found means to keep on with a certain measure of car production; another has grasped the truth that it is necessary, first and foremost, to get through with the war, and to let the future take care of itself. There is no uniformity of view; there are no indications of any national program for the future conduct of the motor car industry; there appears to be very little hope that the government will assist the industry in the critical reconstruction period which will immediately follow the war. It does not seen that any plan has been worked out by which the government could help the industry. The general impression gained after mixing with men in the English motor car industry is that the British car manufacturer does not realize his own strength. He has accepted war conditions according to his particular temperament; he is going through to the end, whatever the end may be; but he has not yet had time or sufficient imagination to lay out possible plans for the future.

Practically all of the English motor car factories are state-controlled. The exceptions are some of the smaller factories which, while undertaking a certain amount of military work, are also continuing the production of cars or other components in which they are normally interested. The amount of such work being done for private owners bears a small proportion to the whole, and is not worth the indignation, or jealousy, as the case may be, of those manufacturers who have been absorbed entirely by the war machine. In this connection, there is no ground for the suspicion that some English makers appear to have, that the French factories are doing more private business then they. The English are doing little for the civilian client; the French are doing less.

Factories under government control are not necessarily prevented from making



Showing how women of France run munition-making machines

The lathe room of the Panhard-Levassor factory. Here women have taken the vacated places of men and made a creditable showing

motor cars, but they are prevented from doing other than government work, except under special circumstances and with special permission. There are shops in which hardly a shell is to be seen, the entire plant and all hands being employed on trucks, touring cars and aviation motors for the army. In others not a single machine is running on motor car parts. The former have a certain advantage over the latter, for they are keeping their staffs on the usual work, they are gaining experience with war models, and that experience can be put to good use when peace is restored. It appears to be one of the chances of war whether a factory shall be kept on trucks and cars, or on shells.

No National Control

The fact is obvious, merely from an examination of the English motor car factories, that there has not been the single, national control of the industry which is such a distinctive feature of the continental industry. A few of the big factories were switched from civilian car work to the production of military motor cars within a week of the outbreak of war and have from that time to the present date been employed exclusively and ever-increasingly on war material. Other and smaller manufacturers state that for months they tried to get war contracts for either motor cars or munitions and failed to obtain any satisfaction from the authorities. Finally they were able to get sub-contracts from the big contractors. Many of these factories now running two shifts on war munitions were doing practically nothing when Asquith made his famous "no shell shortage" speech. Other cases are to be found where factories tried to carry on their ordinary production, building for stock under the impression that the war would be short and that there would be a big demand for cars at its close. Several such factories were suddenly ordered to accept contracts for shells and other military material, and work on cars had to be stopped at practically a moment's notice. This is shown by the large stock of partly finished material—frames, cylinders, gearboxes, axles, motor units, etc.,—sometimes piled up nearly as high as the roof. Control is so close that even the little labor necessary to transform some of these units into complete cars cannot be obtained. In these shops it will be an easy matter to resume work on motor cars without loss of time as soon as military restrictions are withdrawn. Obviously, however, the pre-war models will have to be continued for a certain length of time.

Although there is still room for extension in some of the factories, the engineering industry as a whole appears to be getting very near its maximum output. One authority states that the limiting factor now is the world's product of steel. He claims that the amount of steel being used at present for making shells is equal to the world's total output before the war. As an instance of the world-wide influence of the war on the metal industry, Japan is now supplying some English factories with brass bars.

The work done during the last 12 months is nothing less than stupendous. In this connection it is necessary to avoid anything like precise statements, for obvious reasons. As instances of activity, I was shown one factory employing 2,500 Belgians—men and women—running two shifts and working 6½ days per week, producing 3,500 shells per day, having six hydraulic presses which would go into service within a week and increase the output 100 per cent, and possessing a laboratory and test department equal to those of the best engineering establishments to be found in any part of the world. Where this modern, highly efficient and well organized factory now stands, there was, but one year before, an uncultivated field without a brick on it. It was not only necessary to plan, build, and equip that factory, but to bring together and find accommodation for the workers and their families, numbering about 4,000 persons, most of whom did not speak a word of English.

Accuracy Made Imperative

In another town a French motor car company had opened an English factory and had trained 300 mechanics to the highest class of work, in which no tolerance whatsoever was allowed. All finished parts had to be wholly accurate. While this work was going on in the temporary factory, a bigger factory for 1,000 workers was being erected, the builders being under a penalty of $500 per day for late delivery. In addition to this factory, the same company has completed a new factory in the south of France and has doubled the size of its original factory. Practically all the motor car factories of the Midlands are being enlarged. Building operations are going on both day and night by the aid of special electric lights.

Increased output has been made possible only by a considerable dilution of skilled labor and the introduction of women on work to which they were originally entire strangers. This change is less evident in the motor car plants than in the national ammunition factories. Nevertheless, women are now an important factor even in the motor car shops and they have been responsible for a considerable amount of speeding up. It is found an easy matter to train a woman to get the maximum out of a machine, and this has had its

influence on men who have systematically kept machines below their maximum output.

The change in the internal organization of the factories has not been possible without some friction. There have been strikes in certain districts, and there are a few labor disturbances at the present moment. But so far as the British motor car industry is concerned, it has not been found possible to discover a single case of a strike, and, where there have been dissensions they have always been settled amicably by a straight talk between employers and workmen. As an indication of the spirit of the workers in the motor car industry, one man in a factory having 2,000 employes refused to join up under the Derby recruiting scheme. He was roped into a wheelbarrow and taken by force through the streets of Coventry to the recruiting station. In another factory in the same town 500 men threatened to down their tools if a Colonial who had refused to recognize the recruiting scheme was not dismissed. The man was obliged to leave without waiting for a dismissal from the firm, and could not gain employment elsewhere in the town.

Motor Mechanics' Unique Position

Joining the army under the group scheme does not make any material difference to the majority of the men in the motor car factories, for they are in reserved occupations and are considerably more use to the army as mechanics than as soldiers. The fact remains, however, that by joining the groups they put themselves under military law and could be drawn from their present occupations and put into the army if it became necessary to do so for any reason. The manner in which Bryand stopped the railroad strike in France a few years ago by putting the strikers under military law is an example of the force of this weapon.

There has been a general increase in wages, but this has not attained the proportions stated in many quarters. From close inquiries it is found that wages in the motor car industry have risen 25 per cent on an average. At the same time food prices have increased 30 per cent. As this increase does not apply to more than one-half of the workers' necessary expenditures, the net result is to his advantage. Stories of youths earning $25 to $30 per week are nearly always found to be based on some special week for which accumulated bonuses were paid. In some of the body-building factories, expert workers at piece-rates are drawing $25 per week for aeroplane propeller construction, but this is above the average even in this particular branch. The general condition of working families in the motor trade is better than at any previous time, for, whereas before the war only one member worked, now three to four members can find employment with a minimum wage of $5 a week for girls.

Another section of the lathe room, showing women at work

Although very little publicity is given to the fact, experimental work is still being carried on to a limited extent in the best English factories. In addition the best arrangements possible are being made to return to the usual class of work as soon as release is obtained from army contracts. On the whole, the English factories are better placed in this respect than are the French. In England production was stopped suddenly and no attempt made to use up the series in course of construction. In France manufacturers gradually exhausted their stocks and only ceased building cars when they had nothing more to build them with.

Meager Data of Future Models

Not much information is allowed to get out regarding the contemplated after-the-war models. It is certain, however, that there will be a decided increase in the number of medium-priced cars and in small light two-seaters with four-cylinder motors of 60 by 110 millimeters, 2⅜ by 4⅜ inches, to 70 by 140 millimeters, 2¾ by 5½ inches, bore and stroke. It is believed that whatever the outcome of the war, strict economy will be exercised for a number of years and that there will be no demand for big cars which will be costly to maintain on account of high taxation, and high cost of fuel and tires. At the present time there are important factories with a reputation for the best work and an experience in big cars only, now decided on the production of big series of 10-horsepower two-seaters. These are four-cylinder models with a cylinder bore of 70 millimeters, 2¾ inches, maximum. Other firms, hitherto connected with two models, one of them of 10 horsepower and the other of 14-16 horsepower, have decided to drop the bigger type and devote themselves after the war to the 10-horsepower type.

The position of firms producing costly

(Concluded on page 27)

Women running lathes and drilling machines in French motor factory

Trapping Villa with Motor Trucks and Wireless

Expedition Against Raiders Conducted by Aid of Portable Field-Outfits

Past Years of Application Makes Better Progress in War Promotion

Firing the signal rocket. This device is much used in warfare

By W. D. Hornaday

EL PASO, Tex., March 17—The march of the United States troops into Mexico was undertaken with a feeling of assurance among the commanding officers that the government's motorized army equipment may be counted upon to get results. Several years of martial law along the Texas border has taught military men the practical utility of improved equipment as nothing else could in times of peace. The great usefulness of the wireless-truck outfits and other motor car facilities has been demonstrated day after day for more than 4 years.

Actual Work on Border Now Realized

Few persons in the United States realize that there is a strip of border territory fronting on Mexico and extending all the way from the Atlantic Ocean to the Pacific Ocean that has been on an actual war footing for that length of time. In the lower border region, from a point about 60 miles below Laredo, Tex., to the mouth of the Rio Grande, the protective war measures assumed the form of a sanguinary conflict between bands of Mexican outlaws and the armed forces of the regular army over an extended period, culminating in the raid of General Villa on the town of Columbus.

With a protective force of more than 12,000 men scattered along the international line, conditions have been unusually favorable for testing out certain new war and army theories that could never have been put into actual practice had the military units been confined to garrison duty. The handling and operation of new types of field equipment, the transportation of supplies by motor trucks and various other improvements to the service were put to practical tests during the years leading up to the present campaign against the raiders. The results obtained are considered to be of far-reaching importance. The remote and rough character of country in which the different military detachments had to operate made the training of the greatest value. From the very beginning the mobilizing of American military forces along the Rio Grande and fronting the imaginary line that extends from El Paso to the Pacific Ocean has been largely in the nature of a maneuver camp on a large scale, with the exception that the work performed has been largely of a practical nature.

The putting to actual test of the motor equipment of the field-wireless outfits, during the recent *emeute* in the Brownsville territory of the lower Rio Grande valley, was perhaps one of the most interesting and important developments in the army's movements. There are at this time three government wireless trucks in operation. One of these has been located at Fort McIntosh, situated adjacent to Laredo, another at Mission and the third at Fort Sam Houston. The latter was only recently received and it was reported that it would be sent to Eagle Pass. During the earlier bandit-warfare wireless truck No. 1 was located at Mission, about 60 miles above Brownsville. This outfit consists of a 3-kilowatt machine, a 35-horsepower engine, and the necessary field equipment set upon a White truck. Without the field equipment the truck weighs 9,000 pounds. When in service the aero waves are sent forth from a portable 80-foot mast which is easily set up.

Wireless Pack Sets

As an important integral of this field-wireless service there are attached to it four pack-sets of wireless apparatus, which are transported from place to place upon the backs of pack animals, as requirements may demand. During recent activities the operation of the portable wireless station at Mission in connection with the pack-sets of wireless was of inestimable value in directing the movement of troops. But for this modern method of sending information from point to point along the river the trouble would probably have been much

Rifle practice at Fort McIntosh, Tex., where Uncle Sam's soldiers perfect their shooting eye in preparation for the Mexican expedition

more difficult for the army to deal with.

For several weeks the outfit upon wireless truck No. 1 was kept in operation night and day. Its high power enabled it to receive and transmit messages to the more distant government wireless stations in different parts of the country. It was in daily touch with division headquarters at Fort Sam Houston. Orders relating to field military operations and other matters were received by this central station and when necessary they were relayed to the pack-sets of wireless that were constantly moved from place to place in the turbulent territory. It was from these pack-sets that the truck station at Mission was kept daily informed as to existing conditions in their respective localities.

In one of the night attacks by bandits a pack-set wireless outfit was shot to pieces. It was a difficult matter, however, for the outlaws to cross the river or to move from place to place without detection, and quick news of all such developments was flashed to the central station at Mission and from there relayed to the officers in command.

Night-Riders on Motors

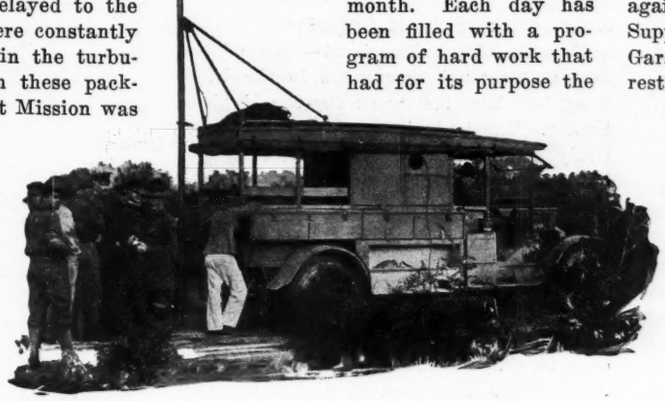
Attached to the field wireless outfits are corps of motorcycle messengers, who, in time of warfare, make rides that are fraught with dangers. It is a part of their duties to carry and deliver wireless messages to patrol-camps and in various other ways to assist in the general system of quick communication between remote points. In cases of emergency at night sky-rockets are sent up as signals to the troops that are out of touch of the field wireless. On one occasion during the campaign on the lower border the motorcycle corps at the Mission central station was ordered out with signal rockets for use in warning the more isolated detachments of impending danger. It was a wild night ride that these messengers made in the performance of duty.

All the members of the field-wireless outfits belong to B company of the army signal corps. Those attached to wireless truck No. 1 who saw actual service in the bandit troubles are First Sergeant A. B. Maloney, operator in charge; Corporal James S. Collins, second operator; First Chief Private Russell H. Blalock, motorcycle messenger; John F. Hutchins, motorcycle messenger; Louis A. Ward, engineer; Chauncey R. Todd, engineer.

Wireless communication between the wireless truck stations at Fort McIntosh and Mission was kept up. The station at Fort McIntosh received the correct time and weather report from the government wireless station at Arlington, Va., twice each day—at 11 o'clock in the morning and at 9 o'clock at night.

The wireless truck at this station made the trip from Mission to Laredo over the rough, border road without incident. It is capable of easily making more than 28 miles per hour upon a good road.

Army officers declare that the training which the soldiers receive during their protracted stay on the border is of incalculable value to them in the march against Gen. Villa. This applies to the various branches of the service. It is not a life of ease that the troops have been leading, even prior to this month. Each day has been filled with a program of hard work that had for its purpose the improvement of the military efficiency of officers and men. They were put through some rough phases of service the severity of which is probably as great as they will encounter while on Mexican soil. The daily target practice of the men and artillery throughout the period of the encampment on the border was an important feature of the military life.



Portable wireless station with telescope pole for elevating antennae

MORE DAMAGES FOR PREST-O-LITE

Boston, Mass., March 18—By the order of the United States court for the district of Massachusetts, the Cut Price Auto Supply Co., Boston, has paid the sum of $286.75 covering damages to the Prest-O-Lite Co., Inc., court costs, etc. An injunction was issued against the Cut Price company and in favor of the Prest-O-Lite company last year restraining this dealer from the sale and exchange of tanks filled by the Searchlight Co. as Prest-O-Lite tanks. At that time a master was appointed by the court to determine the amount of damages.

On the same grounds verdict was recently given in favor of the Prest-O-Lite Co., Inc., against John Brochard, Clarksboro, N. J., with costs amounting to $52, paid by this dealer.

Permanent injunction was granted last week by the United States court for the northern district of Ohio, eastern division, against John G. Honecker, Mutual Auto Supply Co., and the Windermere Euclid Garage Co.—all located in Cleveland, O.—restraining these dealers from the sale and substitution of refilled tanks as Prest-O-Lite tanks to Prest-O-Lite users. The costs of these suits were paid by the defendant dealers, the Prest-O-Lite company waiving its claim for damages.

PROHIBITS PRIVATE CARS

London, March 15—A far reaching order in council, which will prohibit importation into the United Kingdom of a large number of articles which come under the general heading of luxuries soon will be issued by the British government.

Among the things which will be barred will be motor cars for private use, musical instruments, cutlery of all kinds, hardware, yarns, chinaware, fancy goods, and soaps.

FOUR WAR TRUCK COMPANIES

Fort Sam Houston, Texas, March 17—Motor trucks are to be employed on a large scale in the transportation of war materials and supplies for use of the contingent of the regular army that has been sent into Mexico for the purpose of capturing or disposing of the bandit, Francisco Villa. It is expected that not less than four motor truck units, or companies, will have been organized and placed in active service in Mexico and upon the border within the next few weeks. Already two companies of this character have been formed.

Light artillery practice of the border. This has been prosecuted for many months and makes our gunners rank high as marksmen

Rush Trucks to Mexico

Two Concerns Are Awarded Contracts by the United States Army

Government Will Make Comparisons Between Different Types

CHICAGO, March 21—Hurry-up war orders have demonstrated what American motor truck makers can do in the way of quick mobilization of commercial vehicles at the Mexican frontier. The White Co., Cleveland, O., and the Thomas B. Jeffery Co., Kenosha, Wis., have been awarded contracts for furnishing the trucks requested by General Funston for the campaign to capture Villa.

Colonel A. S. Smith, U. S. army depot quartermaster, says he believes that speed in delivery is a prime factor on which awards are based and he attributes the selection of two companies to the desire of the government for an experiment in trying out different types of machines.

The proposals were for fifty-four 1½-ton motor truck chassis, two wrecking and supply trucks to be equipped with machines for field repairs, such as a small lathe, a drill-press, a forge and a bench vise, and a selection of repair parts. In addition to these, fifteen motorcycles for the use of corporals and messengers are to be supplied. These trucks will be divided into two companies organized along lines identical with those used for horse companies, there being twenty-seven trucks and one wrecking car in each company.

Manning the Equipment

The men desired to go with the vehicles are one truckmaster at $150 per month, three assistant truckmasters at $125, one mechanic at $125, one assistant mechanic at $100 and twenty-seven drivers at $100 for each company. These men are to be civilians familiar with the operation of the vehicles, and are to be paid by the Quartermaster Corps.

No bodies are asked for; the regulation United States army body, 10 feet, 4 inches long, will be used. The trucks are to be delivered f.o.b. the factory. The regulation United States army specifications for 1½-ton trucks are asked for, but delivery will be one of the prime considerations.

More reliance is to be placed upon these two companies than would at first be apparent, for it is expected that the two truck companies will furnish the entire transportation for the present force of 5,000 men, in the expedition into Mexico, between the base of supplies and the troops. Each regiment will have its own company of twenty-seven horse wagons, but the trucks will be the connecting link between all five regiments and the base of supplies.

Colonel Smith, who has seen service in Sonora, states that one truck company of twenty-seven trucks should be sufficient for the entire force for the first four marches of 20 miles per day, after which the second company will be needed. He points out that service in Mexico will be very different from that in Europe today, as the distance which the troops will travel and the amount of marching they will do will be much in excess of that encountered abroad. It is estimated that the two truck companies will cost about $125,000.

Kenosha Motor Squad Organized

Kenosha, Wis., March 21—One of the first motor truck companies in the U. S. army left here last week for the Mexican border. The body is composed almost entirely of civilians recruited within a few hours after the receipt of a hurry-up order from Washington and was organized under the direction of Colonel A. D. Kniskern, chief quartermaster of the central department of the army.

The basis of the new unit is made up of twenty-seven Jeffery quads and one armored truck. Another company was organized with a like number of trucks from the White Co., Cleveland, O.

White Trucks to Front

Cleveland, Ohio, March 18—The White Co., of this city, was awarded the contract Tuesday for twenty-eight trucks by the U. S. Government for immediate shipment to the Mexican border and within 24 hours a special freight train pulled out of the city with the order complete. The train left at midnight.

Motor Truck Co. No. 1 was organized from employees of the White company and others to take part in the punitive expedition into Mexico. It consisted of thirty-four men, selected by Captain James Furlow, an army officer, and they enlisted for 3 months' service. The truck manager, Thomas Parrymore, was an employee of the White company.

The men started at once for El Paso, where they will take charge of the trucks which will transport water and supplies for the use of the troops.

ORGANIZE ARMORED TRUCK TRAIN

New York, March 18—An armored motor battery is being organized and mustered into the New York National Guard at the armory of the Twenty-second engineers.

The equipment for the battery, built like those on European battlefields, will cost more than $100,000. The funds were given for the purpose by Elbert H. Gary, Henry C. Frick, James M. Wallace, Dudley Olcott II, Colonel William F. Thompson, and Lieutenant Harry G. Montgomery, who will command the outfit.

There will be eight or ten cars in the battery, with chasses built of thick armor plate steel, armed with revolving machine guns propelled by high-powered motors capable of driving the heavy trucks at great speed.

Still a Car Shortage

Detroit Makers Are Shipping Product on Flats and Gondolas

Railroads Ask for Co-operation from Manufacturers

DETROIT, March 20—An investigation made among the local motor car manufacturers shows that there has been little change in the freight car shortage situation during the last 4 weeks. Several manufacturers say the situation is worse rather than better, one or two only say there is a very slight improvement. Many makers have scouts out looking for freight cars in which to make shipments.

The railroad officials claim that they are not to blame, as they are practically powerless to remedy the condition. One railroad man, who has been handling the freight end of the road here for a score of years, says that the present situation is without a precedent in the history of American railroads and that the situation could not have been foreseen a year ago.

"To a great extent the motor car manufacturers are to blame for their plight. How could we, the railroads, know that twice as many automobile freight cars would be needed this year? The manufacturers did not advise us that they were going to double or treble their production, they did not co-operate with us as they should do and thus give us an opportunity to prepare ourselves for the increasing freight. How, then, can they consistently say that the railroads are to blame?

More Cars Ordered

"We have ordered more special motor car freight cars, but we, like the manufacturers, are held up because the manufacturers of these freight cars cannot get their needed materials. Instead of being able to deliver the freight cars to us in 2 or 3 months there will be a delay of five or six and possibly more before we get the several thousand freight cars ordered last year."

Hardly any of the local motor car makers are able to get anywhere near the number of freight cars now needed. Not even enough flat cars. Of course the maker who has but a small production is not so strongly affected as the one who produces from 100 cars and upwards a day.

Dodge Bros. say that they are short 40 per cent of the number of freight cars they need. They do not like to ship on flat or open cars but, of course, do so when necessary, but only within a radius of 150 to 200 miles.

Studebaker is much displeased although getting a little more cars, but as production is being increased the situation remains practically unchanged. Packard and Chalmers cars continue to be shipped in large number on flats or gondola cars.

Organize New Rim Co.

Perlman Corporation, with Capital of $10,000,000, to Make Demountables

Production Will Not Be Halted by Infringement Injunction

NEW YORK, March 20 — The patent rights of Louis H. Perlman, controlling the construction of demountable rims have been transferred to the Perlman Rim Corp., which has been incorporated under the laws of New York, with capital of $10,000,000, and Mr. Perlman has made the announcement that there will be no halt in the manufacture of rims for the motor car industry.

The Perlman Rim Corp. is an independent organization, not affiliated with any of the existing rim manufacturing companies, according to the authorized statements of Mr. Perlman and his associates. The financial arrangements of the new corporation are being perfected this week under the direction of L. G. Kaufman, president of the Chatham & Phenix National Bank, who has the active support of other influential interests. Definite announcement of the men who are backing Messrs. Perlman and Kaufman has not yet been issued, though it is believed that among them is W. C. Durant, whose relations with the banking institution which Mr. Kaufman represents are well known. The Durant Chevrolet Co. says there is nothing additional to be given out at present.

That the new company can begin at once the manufacture of a sufficient quantity of rims to supply the industry, without relying on the production of the Standard Welding Co., is questioned by motor car manufacturers, many of whom are watching developments closely in the desire to know what the result of the situation will be with regard to their contracts with the different rim companies. However, Mr. Perlman declares the new company already controls one rim factory and is prepared to make offers on other plants. The production of the Standard Welding Co. has been discontinued while negotiations are pending between the patentee and the Standard representatives. No agreement has been reached upon the question of proper royalties.

J. C. Manternach, general manager, Standard Welding Co., makes the following signed statement under date of March 17:

We have made, and are still making, persistent efforts to adjust equitably this matter to prevent any disturbance in the industry, especially at this time when motor car monufacturers have so many other detrimental conditions to contend with. In our negotiations with Mr. Perlman every effort was made to arrive at a satisfactory settlement, not only on past business, but on all business now on the books, and all future business.

We are willing to give Mr. Perlman every penny of the profit on our demountable rim business for the past 3 years, as well as all profits on such business now on the books, and under contract—these profits to be determined by any reputable firm of certified public accountants. Leaving it to Mr. Perlman to fix a reasonable royalty for all new business, it was suggested to him that under the present strained conditions of the material and labor markets, 25 cents per set was all that automobile or rim manufacturers should be called upon to pay in the way of royalty.

It was also stated to Mr. Perlman that under normal conditions the rim and motor car manufacturers might be willing to pay as high as 50 cents per set. Anything beyond that sum seemed unreasonable and not in line, or consistent with, the price of the article involved.

The effect of this decision is of far greater moment to the industry than to us. Although we have made by far the greater portion of demountable rims, the aggregate of such business is only a small part of our total business. We furnish the bulk of steel tubing used by the bicycle, motorcycle and motor car industries.

We will not discontinue the manufacture of plain clincher and quick detachable rims, or the manufacture of motor truck bands, tire bases, etc., which Perlman's patent does not cover, and which form the major portion of our rim business.

CLINTON REPORTS SUCCESS

Clinton, Ia., March 18—Clinton's first annual motor car exhibit ended tonight after a successful four-day run. The show was held under the auspices of the Clinton Automobile Dealers' Association and took place in the Coliseum. Forty cars were exhibited.

Defrauding Car Owners

Counsel for A. A. A. Presents Facts on Unfair Practices of Certain Houses

Firms Soliciting Accessories Trade Substitute Other Parts

WASHINGTON, D. C., March 20—Judge Richard H. Lee, Cleveland, Ohio, counsel for the A. A. A. and the Ohio State Automobile Association, appeared before Solicitor Lamar, of the postoffice department, March 15, and made an argument in behalf of the motor car interests of the country, in which he asked for the issuance of a fraud order against a number of concerns which, Judge Lee said, are victimizing car owners in large numbers.

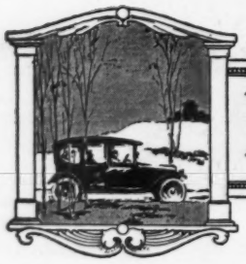
Judge Lee, in his argument, went into the methods by which these concerns seek to secure trade. Circulars and catalogs are sent out in great numbers by these dealers, according to Judge Lee, to owners in which standard parts and equipment are offered at from one-half to three-fourths less than the usual cost.

When orders are sent in, he said, for such parts and equipment by owners who naturally are attracted by the alleged reduced prices, they receive, as a rule, parts or equipment other than ordered with a statement from the dealers to the effect that they happen to be out of the part or equipment ordered, and the suggestion that what they have sent is just as good.

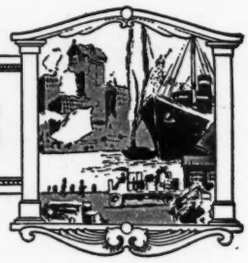
PITTSBURGH SHOW ON

Pittsburgh, Pa., March 20—The twelfth annual exhibit of the Automobile Dealers' Association of Pittsburgh opened in Motor Square Garden last Saturday night and is on for all this week. The initial crowd was estimated at 1,900. This was altogether the biggest opening night ever seen.

Dealers' banquet at annual meeting of Chicago Automobile Trade Association



EDITORIAL PERSPECTIVES



The Gasoline Situation

WHILE the present rapid rise in the price of gasoline is a matter of concern to motorists, the situation is not so grave as many would like to paint it, as there is no necessity for anyone keeping his car in the garage because of the large item of the gasoline bill. Although the retail price of gasoline today ranges from 21 to 30 cents per gallon in different parts of the country, and although there are prospects of the price reaching 40 cents, fuel is still a relatively small item in car expense with many city owners. With the city owner, garaging may cost $360 to $450 per year, whereas gasoline will not go over $150. Insurance frequently is over $115 or tires $175, so that fuel comes in fourth place.

A GALLON of fuel is doing a great deal more for us today than it did a year or 2 years ago. Today we have smaller cylinders and higher crankshaft speeds. With lighter pistons, and lighter connecting rods, the motor efficiency has risen materially. Then, too, cars are lighter and so the gallon of fuel goes farther. Our roads are being improved rapidly and every time we get an improved mile of highway, we save on the gasoline bill, we make the precious gallon go a few rods, perhaps furlongs, and it may be, a few miles farther.

BUT go a step farther: The engine efficiency has been increased in other ways, such as better valve action to give more power. There is a better combustion of the mixture. Ignition gives an increased spark; in short, many other improvements might be cited to show why a gallon of gasoline will carry us farther in 1916 than it ever has done before.

THE present increase in the price of gasoline is largely due to the shortage in the supply of crude, due to the heavy falling off in output of such oil districts as Cushing, Oklahoma, as told of on other pages of this issue. It is expected that new oil fields of great productivity may be tapped in the near future, but until that time, the law of supply and demand will rule, and so if there is a shortage of crude, there will be an immediate rise in price. We have been in such a period since last July and may continue in it for many months yet, until the new gushing wells are struck, when the supply will increase and the price fall.

WE never have been able to get away from this supply-and-demand regime, and never will. We are in the midst of it today in the steel world, and it promises to continue there for 4 or perhaps 5 years. There is an unparalleled demand for steel from the warring nations, from our own railroads, and from all of our industries. With such a demand, we cannot expect anything but rising prices.

WITH a gasoline shortage, the natural solution is to turn to kerosene. There is today a surplus of kerosene. It is a drug on the market, it is being stored in large quantities by those refineries that can afford to build storage tanks. So long as we make gasoline from crude we make kerosene. You cannot get the gasoline and not the kerosene. Today kerosene is selling at 8 cents per gallon and gasoline at 20 or 21 cents.

THIS kerosene can be used as a fuel. It possesses more heat units than gasoline, but the difficulty lies in breaking it up and vaporizing it. Heat is generally used for this purpose. Once the kerosene is broken up and kept in the vapor state it is a good fuel. True, it is not so good as gasoline. Kerosene gives best results when used in a motor that is carrying a constant load, such as in a stationary engine, which is grinding corn, that is working on a steady load. It can be used very satisfactorily in farm tractors, in motorboats and in motor trucks. In motor cars, where the load changes so frequently, the kerosene is not so flexible to control as gasoline and consequently not so good.

BUT kerosene can be used on motor cars, and if the price of gasoline goes higher, and remains there, it will be highly desirable to adopt kerosene. It can be used on the ordinary motor, with a few alterations, such as changes in the manifold and carbureter. Much heat is needed in the carbureter. Cars have been running very successfully on kerosene for several years, in the hands of carbureter men. They have had the problem in hand.

THERE is nothing of grave concern in the present crisis. It is a time for sane judgment, and is no time for hasty precipitate action or stampedes. If we have to go to kerosene, we can go about it in a business way. In the meantime let all unite in conserving so far as possible the gasoline supply. Let us keep the carbureter more closely adjusted than we have in the past; let us be less wasteful of fuel when the car stands by the curb; let us shift gears more on the hills; let us use the dash adjustment more; in short, let us take a lesson in self-denial, and meet the exigency in the best possible way. The cowardly way to meet it is by keeping the car in the garage, or cutting down the use of it.

Tire Pressure Bugbear

LAST week a garage man used three different tire pressure gauges on a tire and all three showed widely differing air pressures. One gauge was an old one, carried over from last season; another one was a new one that had not been properly calibrated, and the third one, by comparing with others, proved to be fairly reliable. Is there any reason why tire adjusters meet day after day with cases of tires being ruined by running with too little inflation? The owner should occasionally check his gauge against others, and if possible against new ones. Each garageman should give this matter careful attention and tire bills are too expensive to be brought on by such needless causes.

SO IN the car. The designer, who is familiar with the laws relating to curves in body lines, must be heeded. He at once rules out of the design a curve leading the eye away from the general scheme of the car. The novice, ignorant of even the elements of curves, mixes an incorrect curve in the lines and spoils the whole. He has a body that lacks the style of the other maker but he knows not why. His body has been fashioned along lines thought necessary in order to give strengh, to make the doors swing properly, or to have the seats properly supported on the frame. All curves are contorted, if necessary, to support engineering theories or practice.

How Many Horses a Tractor Displaces

IN commenting on the advisability of using a tractor large enough to pull a three-bottom plow on a farm of 160 acres Prof. I. W. Dickerson, of the farm mechanics' department of the University of Illinois, favors a machine costing less than $1,000 where three horses are displaced, thus giving a good return on the investment.

"It is really a matter of balancing the cost of keeping and operating the three horses displaced," he said. "At the same time the work for which it is adapted can be done better and in less time. It should be kept in mind, however, that the secret of success or failure in tractor operation, lies largely in the farmer himself and his ability and willingness to master the details of operation. In general I have not advocated very strongly, the use of a tractor on a quarter section of land as I think its economy on such small tracts would be doubtful. When the 3 or 4-year rotation is followed, the amount of plowing, harrowing and pulverizing in any season, will not be very great and, unless the farmer has some belt work with a corn sheller, etc., a tractor may not pay. There is no doubt, however, that two such farms could find enough work to justify such a machine."

ARIZONA LAW DECLARED FAULTY

Phoenix, Ariz., March 18—In his annual report for 1915, Secretary of State Sidney P. Osborn emphasizes the necessity for vital changes in the Arizona motor vehicle registration law.

The cost of a license for a car of less than 25 horsepower, A. L. A. M. rating, is $5, it is $10 if the engine has greater rated horsepower. Osborn says that this is unfair to the owners of old cars that are worth only a fraction of the prices paid for new models, and recommends that provision be made for a sliding scale of reductions on cars that have been in use over two years.

When the year is half over, one-half the regular fee is charged for a license good till the first of the following year. Mr. Osborn thinks that a reduction of 25 per cent should be made after the close of the first quarter, and 75 per cnt after the third quarter.

Fifty cents for recording the transfer of ownership of a car, and 25 cents in the case of a motorcycle, would be sufficient to cover the cost of the service, declares the secretary. The present transfer fees are $2 and $1.

An amendment requiring that the upper half of headlight lenses be frosted is strongly recommended in the report.

The chauffeurs' license system is condemned as a farce, for no examination is required. Osborn urges that the license either be abolished entirely or that applicants be required to pass a rigid practical examination before securing license. He draws attention to the fact that the Arizona law requires a railroad engineer to have had 3 years' experience, and says: "For every chance of accident to a locomotive there are a hundred chances for a motor car accident."

Under the Arizona law the number of another state is recognized for 6 months. California recognizes an Arizona number only 3 months and other states only 1 month. Osborn believes that the Arizona law should be changed in this respect and a reciprocity provision added.

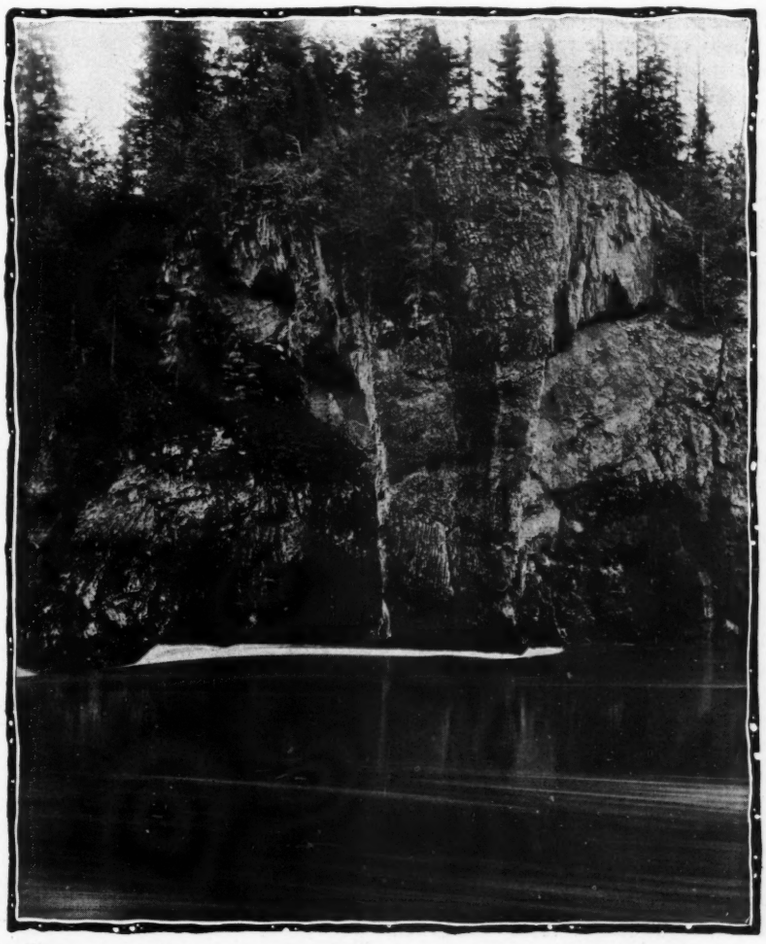
The total fees received from the operation of the motor vehicle law in 1915 were $45,579, as against $34,077 in 1914 and $20,933 in 1913.

Number plates were issued to 7,308 cars in 1915, 5,040 in 1914 and 3,098 in 1913.

"Houn' Dawg" Features in an Accident Suit

THE legal status of the "houn' dog," the variety made famous by Champ Clark, and whether or not the laws of Missouri protect such an animal from injury by a motor car are to be determined by the St. Louis court of appeals in the suit of Paul W. Floweree against Wade Thornberry. Floweree, known as the "blind fox-hunter" of New London, Mo., claims $650 damages, $500 actual and $150 punitive, for the death of his houn' dog under the wheels of Thornberry's machine. Floweree claims that Thornberry was driving at an excessive rate of speed and did not exercise sufficient care.

See America First . . . See America Now



EDITOR'S NOTE—This is the seventy-first of a series of illustrations and thumb nail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the points of interest in their own country.

NO. 71—WHERE THE ELEPHANT DRINKS IN THE PEND D'ORIELLE

JUST out of Spokane, Wash., to the northeast is a freak of nature, carved in solid rock. The illustration above shows where the big elephant drinks in the Pend D'Oreille river. A glance at this picture will reveal the likeness of a huge elephant's head and trunk, with his trunk extending down into the water.

Sheepshead Bay Races

150-Mile Contest Under New Rules of A. A. A. for Championship Award Events

Short Races on Program for Opening Day of Season

NEW YORK, March 20—The entry blanks issued for the opening races of the season at the Sheepshead Bay speedway, May 13, embrace a schedule of four events, for which cash trophies of $20,000 will be awarded. The chief event will be a 150-mile race for the Metropolitan trophy, to be run according to the new plan of the Contest Board of the A. A. A. for championship award events, official sanction having been given the race. All races of the day will be for cars of class E non-stock, with 300 cubic-inch piston displacement or under.

The awards for the 150-mile event will be as follows: First prize, $6,000; second prize, $3,500; third prize, $2,000; fourth prize, $1,500; fifth prize, $1,000; sixth prize, $600; seventh prize, $400. The Metropolitan trophy will be contested for over a period of 3 years or 5 years.

The second event will be the 50-mile race for the Queen's cup, in which prizes varying from $1,000 to $200 will be given to the winners of the first five places. The 20-mile race, for the Coney Island cup, carries prizes of $1,500, to be divided among the first five places. The last event is the 10-mile handicap for non-winners, open to all who fail to win a place in the other races. The William Kemble cup will be awarded permanently to the winner and $1,000 in prizes distributed among the first five places.

Besides providing an attractive program of short races, the Sheepshead Bay Speedway Corp. will offer an added feature in the form of a 10-mile contest between three racers, to be selected for their ability to make speed.

TWIN CITY RACES MEMORIAL DAY

Minneapolis, Minn., March 17—R. J. Young, superintendent of the Minnesota & Ontario Power Co., International Falls, Minn., has been made manager of the Twin City speedway. He announces four races for Memorial day, or two 10-miles races, a 50-mile and a 100-mile brush. The race for July 4 will be 300 miles. When the weather moderates Mr. Young will have the concrete track resurfaced. A policy of $100,000 covering the grand stands has been taken out. The stands are built of wood.

DUESENBERGS ENTER INDIANAPOLIS

Indianapolis, Ind., March 18—The first three official entries made for the Indianapolis speedway 300-mile race this year were made by F. S. Duesenberg for the Duesenberg cars, three in number, with O'Donnell, Henderson and D'Alene as drivers.

During 1915 the Duesenberg cars made thirty starts. They finished first once; three times they took second place; five times they took third prize; twice fourth position; four times they came in fifth; twice they came in sixth; once they finished seventh; twice they ran in eighth place, and once in ninth place. A Duesenberg won the $15,000 trophy at Des Moines.

GUIDEPOST WEEK IN INDIANA

Indianapolis, Ind., March 20—The Hoosier State Automobile Association has made a successful start toward holding a "Guidepost Week" in Indiana. The idea originated with the Hoosier Motor Club. The state organization is seeking the coöperation of the thirty-three motor clubs of the state, the railroads, the county commissioners and others who will aid the movement.

THE PENROSE TROPHY

One of the richest trophies ever offered for a motor race which has been given by Spencer Penrose, Colorado Springs, Colo., sportsman, and for which speed demons will race over the Pike's Peak Highway, highest of the earth's motor roads, to the summit of Pike's Peak, August 11 and 12, 1916. The races will be the most spectacular in the history of motor car competition

Records Fall at Ascot

Oldfield and Burman Make New Figures on the Southern California Track

O'Donnell Wins in a Duesenberg, at 69.20 M.P.H.

LOS ANGELES, March 19 — Special telegram—Out of a field of five starters, Eddie O'Donnell, in a Duesenberg, won the 50-mile Ventura trophy race on the Ascot speedway at 69.28 miles per hour, this afternoon, before a crowd of approximately 30,000. O'Donnell's time for the fifty laps, which he covered without a stop, was 43 minutes 5 seconds. Bob Burman, in the Peugeot, captured second honors, covering the distance in 43 minutes 13 seconds, or at 69.42 miles per hour. Eddie Pullen, in the Mercer, finished third with 44 minutes 4⅖ seconds given out as his official time. His average speed was 68.05 miles per hour.

When Pullen finished, Durant, in the Durant special, and George Hill, in the Cyclone, still were running, but were flagged. Pullen and Burman switched back and forth many times during the race. Pullen was leading in the nineteenth when he stopped for his first tire change. Burman lost his lead in the twenty-first lap when he stopped and changed the right rear and right front. Eddie O'Donnell went into first place at this point and held that position throughout the race.

Oldfield Breaks Record

Barney Oldfield, in the Christie, broke the speedway record, turning a lap in 45 seconds flat. Burman, from a standing start, made a lap in 58⅕ seconds, which also made a new record.

In the Australian pursuit race, Teddy Tetslaff, in the Milac, made 9¾ laps in 9 minutes 41 seconds. Frank Elliott, in the Gordon special, was second.

In the Class C event, Tetzlaff, with the little Milac, covered the 10 miles in 9 minutes 44⅗ seconds. Paul Mahoney, in a Ford special, took second money, and R. C. Durant, in a special Chevrolet, won third place.

ST. PAUL OUT OF A. A. A.

St. Paul, Minn., March 18.—Owing to differences of opinion between the Twin Cities the Automobile Club of Minneapolis has withdrawn from the Minnesota State Automobile Association and the A. A. A. The result is that H. H. Orme, retiring president of the Automobile Club of St. Paul, has had to drop his membership in the club and join the Minneapolis club to retain the presidency of the state association. At the annual state meeting in St. Paul recently a strong play was made to transfer the secretaryship to the secretary of the St. Paul Club. The city got the presidency and

the directors reëlected G. Roy Hill, Minneapolis, as secretary. The St. Paul club has withdrawn "because it is felt that the objects to be achieved in both associations already have been accomplished.

PACIFIC NORTHWEST PROGRAM

Spokane, Wash., March 17—Racing will be a popular sport in the Pacific Northwest during the coming season. Already meets have been arranged under the direction of Guy E. Riegel, of Spokane, and Robert A. Hiller, of Seattle, for the Tacoma speedway May 30, Spokane-Coeur d'Alene track July 4, with purses aggregating $2,000, July 5, purses, $1,000, and Portland, Ore., August 12, purses, $1,500. The Tacoma Speedway Association will hold the Pacific Northwest classic on August 5 with purses of $10,000.

A feature of the Spokane-Coeur d'Alene meet will be the event for Inland Empire cars, which is intended exclusively for Spokane and vicinity racing cars.

WILCOX QUITS RACING

Indianapolis, Ind., March 18—Howard Wilcox has announced his retirement from motor car racing. He has entered the dealer field with Don Herr, as state distributors of Case and White cars. He has been in the racing field for nearly seven years. Wilcox states that he is going to drive in one more race but only because he has given his word to do so. The Rotarians in Indianapolis will hold a meeting in the fall, and as an entertainment a special race will be staged at the local speedway.

FEAR JITNEY STRIKE

Reading, Pa., March 18—While other cities are decrying the jitneys and ordinances are being enacted to legislate them out of business, in Reading the city is faced with a serious transportation problem through the threat of local jitneymen to go on strike, and thereby tie up some industries, if a proposed ordnance is put through councils. The jitneymen object to the provisions which would make a license fee and a bond necessary. For a while council was deadlocked over what the amount of bond should be, some suggesting $1,000 and others as much as $2,500. It was decided to toss a coin, but the matter is still unsettled and is likely to continue in that state for some time to come.

Like American Cars

Australians Find Yankee Product Meets Local Conditions

Object to "Stove Enameling" of Motor Vehicle Bodies

SYDNEY, Australia, Feb. 25—The imports of motor cars, chassis and bodies from the United States in 1916 exceeded those of Great Britain by more than 80 per cent. A writer in the Sydney Times, discussing the popularity of American-made cars, makes allowance for the handicap placed upon the English motor-car makers by the war and then concludes that the war has less to do with the increased demand for American cars than the real merit of the cars themselves.

In his estimation the machines from the United States give better, all-around satisfaction to the average man than does a more expensive English car. Patriotism bids him patronize the British manufacturer, but he admits that Australians, like other folks, are prone to buy where they can get the most for their money. He speaks of his own experience with American and English cars as follows:

"I have recently been accused of 'coming down' to an American car, and with being unpatriotic in the purchase of same. In reply to the first, I haven't—the American car has 'come up' to me instead, and the great improvement in Yankees would be recognized by a good many others if their prejudice would allow them to admit it. As regards the second, I have already expressed my opinion, and much as I regret having to go outside, not only Australia, but the Empire, for the car I want, and which I can buy here for between £400 and £500, one has to choose between doing that and waiting until the end of the war, and then paying the exorbitant price, from my point of view, or perhaps £800 for an English car that will not answer my purpose as well.

"The requirements of different owners in this country vary considerably, but the sort of car that the greatest numbers of Australians want is probably a strong, serviceable five-seater, which will average 22 miles per hour without at any time being fully extended.

"The painting of the average American car is probably its worst feature, most of them being stove-enameled, and this soon gets shabby. A few, however, are coach-painted; and, in any case, it does not cost a fortune to get them properly painted when the stove-enameling comes off."

The imports of motor cars from the United States now surpass those of any other country.

CHICAGO AMATEURS PRACTICE

Chicago, March 20—That there will be a large entry list for the inter-club non-professional drivers' race on the Chicago speedway, May 20, seems to be indicated by the number of amateur speed enthusiasts that were out for a practice with their cars on the board oval yesterday. This was the first regularly observed practice for the unique event, and there were a total of fourteen of the Chicago sportsmen testing the speed possibilities of their mounts. Three weeks ago there was an informal practice staged and on the 2 days of practice there have been eighteen different cars on the track.

The race as planned is an invitational affair and is open only to amateur drivers who own their cars and are members of some of the leading clubs of Chicago and vicinity. The invitations are extended through the clubs and the cars run under club colors.

The qualifications committee of the speedway has drawn up the basis for extending invitations. According to these supplementary regulations the race will be limited to two, three or four-passenger roadster or speedster bodies on roadster chassis, as indicated by the manufacturer's catalog. Motors, while they may be of any piston displacement, providing the bore and stroke is the same as cataloged, and must be of the same general design as cataloged, may be altered as to ignition and carburetion equipment,

Brent T. Harding, a juvenile racing driver of California, will bring his juvenile racing car east this summer and promises to furnish thrills for the spectators at the large motor car races. It is planned for Brent to travel the round with the larger drivers and before the big event for him to hold a 5- or 10-mile exhibition.

Brent was the proud owner of the first juvenile racing car in California and succeeded in capturing seven firsts with this car before he met defeat. His new car has a two-cylinder, overhead valve, air-cooled V-type motor.

lightening of piston and connecting rods, changing valve sizes and lifts, changing of timing, lubrication, fuel feed. Full electrical equipment must be carried with the exception of lamps, but may be disconnected electrically and mechanically. The cars may be geared up as desired.

The intent of the rules is to permit the competition of any cars which are regular product of the factory with any alterations that are possible without the substitution of special racing motors or special bodies.

According to present plans the Chicago Automobile Club will handle the race although no definite contract has been signed between the club and the speedway.

SPEEDWAY FOR ALABAMA

Birmingham, Ala., March 18—The Birmingham Motor Speedway Co. today awarded a contract for a 2-mile speedway around the lake of the Birmingham Motor and Country Club. The road will cost $500,000. August Hermann, of Cincinnati, is president of the speedway company.

CHANDLER TO CAMPAIGN CRAWFORDS

Hagerstown, Md., March 18 — Billy Chandler has completed the three Crawford specials which are to be campaigned under his management during the 1916 racing season. All three cars have been given a road test and one of them has shown 105 miles an hour on the New York speedway. The cars represent an investment of $12,000 and are equipped with sixteen-valve Duesenberg motors. Chandler will drive one of the cars and the other two will be handled by Dave Lewis and Ray Johnson.

DEATH TAKES TIRE MAN

Detroit, March 20—E. R. Hall, experimental engineer to the Goodyear company, died March 17 at Mt. Clemens, Mich. Mr. Hall was a member of the council of the Society of Automobile Engineers and a native of Somerville, Mass. Born in 1855, he was educated at the Massachusetts Institute of Technology and joined the Goodyear company in September, 1908. His appointment as Technical Expert for the company was made in February 1909. Since then the experimental development of Goodyear tires has been in his hands.

SPEEDWAY OFFERED FOR TROOPS

Chicago, March 18—Speedway Park, Chicago, through President David F. Reid, has been offered to the U. S. Government, free of charge for the purpose of establishing practice grounds, training camps and an aviation school. Speedway Park contains 320 acres, is 10 miles from the loop and will be open at any time to the government for use as a mobilization grounds. President Reid extended the use of Speedway Park, to the government, a year ago and last week sent a telegram to Secretary of War Baker, renewing the offer.

It is understood a like offer has been made of the Sheepshead Bay speedway at New York.

Warner Re-Enters Field

Inventor of Autometer Heads New Trailer Concern

Prairie Schooner a Camp on Wheels with Kitchen and Berths

BELOIT, Wis., March 21—A. P. Warner, founder of the Warner Instrument Co., which later became affiliated with the Stewart company, forming the Stewart-Warner Speedometer Corp., has re-entered the motor vehicle business after several years' absence, through a transaction recently concluded here. Warner became head of the Warner Auto Trailer Co., a new concern manufacturing commercial trailers and the type of trailer called the Twentieth Century Prairie Schooner designed to facilitate touring.

The Warner company has purchased the old Thompson plant in South Beloit and approximately 6 acres of adjoining land. The plant has been fitted with new machinery and is now in operation. The plant has a capacity of 100 trailers a day.

The trailers will be manufactured complete in the new plant. Although it had not a plant of its own, the new company has been shipping out large numbers of trailers daily and orders amounting to more than $50,000 are said to be on the books of the company.

Like a Pullman Car

Special attention is being paid to the manufacture of the Prairie Schooner type. The equipment of this trailer includes a tent of heavy double-filled duck of a khaki color which will withstand the rain; two berths with sagless springs, each to accommodate two persons and enclosed by curtain partitions; a stove adequate to prepare a meal for an entire family; an ice chest containing compartments for ice, liquids and foods; and a folding table. All that the tourist must furnish to make it complete is the bedding. This is strapped upon the berth, Pullman fashion, and folds into the box of the trailer when not in use.

One of the Warner inventions which distinguishes the trailer is the hitch by which it is attached to the car. The one-man tent which covers the tourist model of the trailer is an exclusive Warner feature. It can be adjusted entirely within less than 4 minutes.

The trailer weighs when completed for a journey about 700 ponds, but can carry a load of 1,200 pounds. Solid rubber or pneumatic tires are optional.

TWO MORE RAISE PRICES

Chicago, March 21 — Two additional companies announce changes in their prices this week, due to high cost of raw materials.

The Marmon company states that the increased cost of both labor and materials is responsible for an advance in the prices of the Marmon 34, which takes effect at once. The new prices for Marmon seven-passenger touring car and the three and four-passenger roadsters will be $2,950; and for the five-passenger cars, $2,900. This is an increase of $200.

The Saxon Motor Car Co. has increased the price of its six-cylinder cars both touring car and roadster type, to $815, the change to be effective immediately. This is an increase of $30.

LAMP MERGER FORMED

Detroit, March 20—The merger of the Edmunds & Jones Mfg. Co., Detroit; the Canadian Lamp & Stamping Co., Ford, Ont., and the Chicago Electric Mfg. Co., Chicago, which was outlined in the Motor Age of March 16, has been definitely consummated and the new concern is now called the Edmunds & Jones Corp.

Through New York brokers $1,000,000 in 7 per cent cumulative preferred stock and 40,000 shares of common stock of no par value are being offered for sale.

MAKER LIABLE FOR DEFECTS

Albany, N. Y., March 17—A manufacturer is liable for defects in an article which causes injuries to the purchaser, even though the article is purchased through intermediaries, according to a decision of the Court of Appeals, yesterday. The decision is said to establish a new principle in law, for previous court rulings held that manufacturers were liable only for articles inherently dangerous, such as poisons, explosives and firearms.

Suit was brought to recover damages resulting from the plaintiff being thrown out of a motor car purchased a year before the accident. One of the wheels collapsed and it was found that it had been constructed of defective wood and that the defect could have been discovered upon examination before the car left the factory.

FORD CO. TO ERECT ORPHANAGE

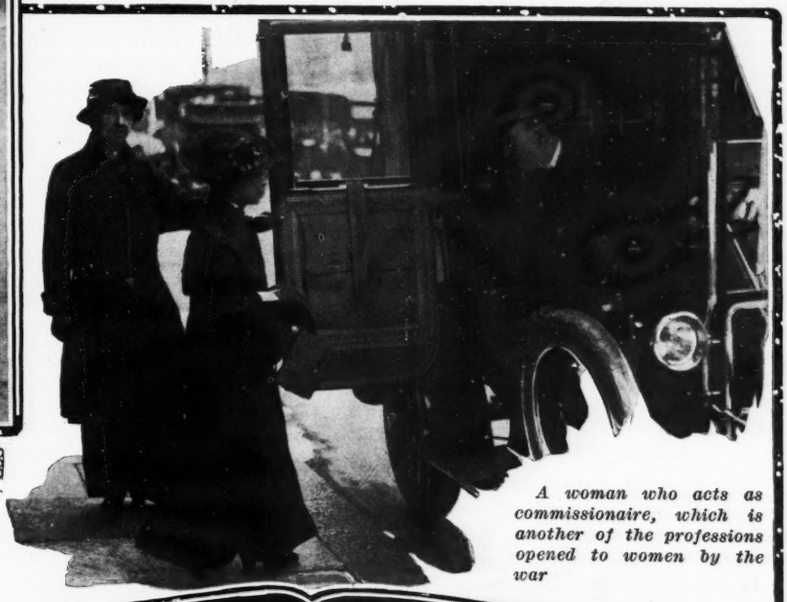
Detroit, Mich., March 18 — The Ford Motor Co. has acquired 6 acres of land and the buildings which made up the St. Francis Orphans' Home for Boys. This property is located on Woodward avenue and constituted a wedge in the ground upon which the new or duplicate of the parent plant is to be erected. By acquiring the land, the Ford company now owns property extending about 2,700 feet along Woodward and about 2,600 feet along Manchester avenue.

The deal was made with the bishop of the diocese of Detroit and provides that the Ford company give a 32-acre tract of land in another part of the city, that it will erect immediately a new home for orphan boys having accommodations for 500, and the necessary accommodations for employes and sisters; that it fully equip the building, as well as the campus, providing walks, drives, grading, etc., and assume all indebtedness against the present home.

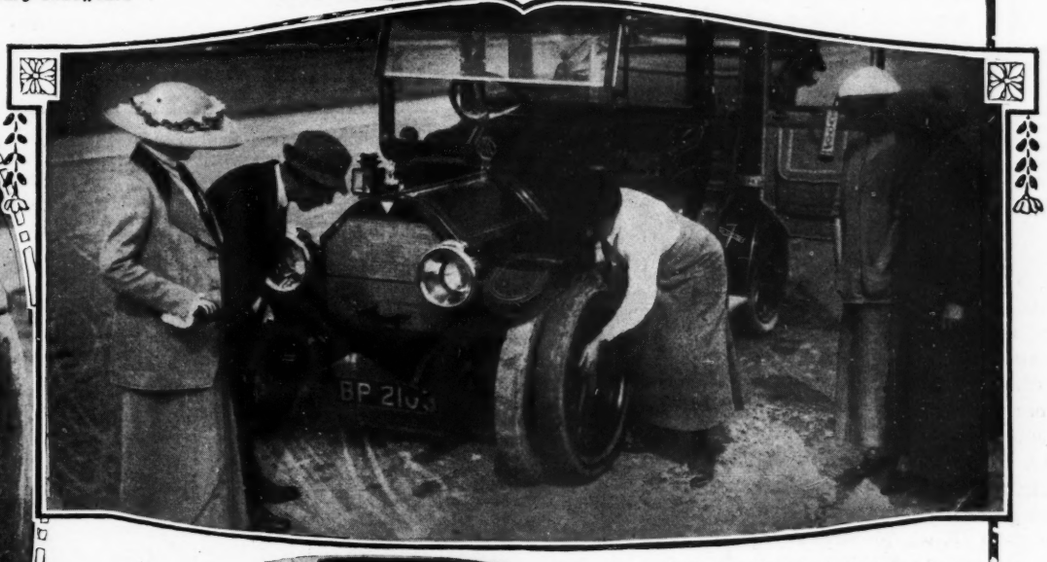
Feminine Taxi Drivers of London Prove Able Chauffeurs

Profession Filled Only by Men Before the War Has Become Women's Sphere

An English woman who has become a chauffeur during the war. She is washing her taxicab, as do many women who have taken the places of the male drivers now in France as military chauffeurs



A woman who acts as commissionaire, which is another of the professions opened to women by the war



Owing to the fact that so many chauffeurs have gone to the front as ambulance drivers or transport drivers, many motor firms in London have filled the places of the men with women, who receive 30 shillings per week. When something goes wrong on the street, the women must make their own way out of the difficulty

In a London street one may see such incidents as this, where a woman driver of a motor car or taxicab has stopped to pump a tire or to put in a new inner tube. They have been trained to make all the ordinary repairs which may be required and they do the work with a facility which one would hardly have expected to see

Even the motor vans and heavy delivery trucks are handled by women. The lower picture shows Miss Hay, who drives a motor delivery truck for one of the army and navy stores in London. The concern is one of the largest houses in London and has a large force of women at work in its motor delivery service

Substitute Fuels for Motors—Future of Gasoline Supply

Possibilities of Alcohol and Benzol Discussed—Problems in the Use of Kerosene —Changes Necessary for Employing Low-Grade Distillates

NEW YORK, March 18—The consumption of gasoline during 1915 was 25 per cent greater than during 1914, and it is expected that 1916 will show more than 25 per cent increase over 1915. In 1915 the production in America was 1,747,200,000 gallons, or in barrels of 42 gallons each, 41,600,000, according to E. S. Foljambe in his paper before the Metropolitan section of the society of Automobile engineers here last night.

This production of 41,600,000 barrels in 1915 as compared with 34,915,000 barrels in 1914 shows the increased demand on gasoline due to more motor cars, also due to the export trade. An increase in export trade cannot be advanced as a reason for the present increase in price, as there were 5,000,000 barrels exported in 1914 as compared with 6,500,000 barrels in 1915. The export business is approximately one-seventh of the total production.

Mr. Foljambe in looking for a solution of the present high price of gasoline found it largely in the failure of crude from the Oklahoma and Kansas fields, and particularly in the great Cushing pool which was the greatest crude producing zone in the world until August, 1915, when its great supply suddenly dropped off and immediately the price of crude began to aviate and with it, almost in advance of it, went up gasoline prices.

Failure of Crude Supply

This now famous Cushing pool or well was yielding the phenomenal volume of 300,000 barrels a day in April, 1915, or more than two and one-half times the total production of the remainder of Kansas and Oklahoma. The Cushing pool, with its 120 wells, gradually decreased until January, 1916, when it was producing but 100,000 barrels a day. Fortunately at the end of 1915 there was a good reserve stock of Cushing crude, which was from 10,000,000 to 15,000,000 barrels larger than at the beginning of 1915.

It is impossible to understand the part played by the Cushing pool in the crude and gasoline price field without a brief historical glance over this wonderful oil field. The Cushing wells in Oklahoma were opened in January, 1913, and up to which time production in the district was 1,300 barrels per day. The first week of January, 1913, Cushing wells yielded 11,000 barrels per day; by the end of the month the output was 20,000 barrels per day; in December, 1914, it had risen to 240,000 barrels per day; and its zenith of production came in April, 1915, when the daily output was 300,000 barrels. Then commenced the serious decrease which has exerted such a country-wide influence on prices. The enormous Cushing surplus in storage warded off an immediate panic in prices. From July, 1915, this surplus has been drawn upon to supply the shortage represented by the difference between daily production and existing transportation or refining capacity. This surplus has had a tendency to steady the oil market, but as the stock was controlled by the larger companies, it has been withdrawn from the open market. Light is thrown on this subject by the report of Secretary Lane of the Interior, in which he says: "Thus, while there is a market shortage of Cushing crude, which is directly responsible for some of the independent refiners paying a premium of from 20 to 50 cents a barrel above the quoted market price, other companies have not exhausted their 1915 surplus of Cushing crude. Since these larger companies have, in fact, larger stocks than a year ago, it follows that with them the shortage of gasoline-rich crude is at most only threatened and to the extent that these companies are using their 1915 surplus, the threatened shortage is not yet a factor in increasing the cost of gasoline."

Why Gasoline is High

1—Increase in consumption of gasoline in the United States during 1915, 25 per cent greater than in 1914 and a similar increase in 1916.

2—Increase in exports, the figures showing the exports of naphtha and lighter products of 1914 to have exceeded those of 1913 by 500,000 barrels and the exports for 1915 to have exceeded those of 1914 by 1,500,000 barrels. No government figures are available since these, but the exportation to Europe continues to increase.

3—The depletion of gasoline stocks, due to increased domestic and export demands. On Jan. 1, 1915, the refiners' storage stock of gasoline amounted to approximately 2,000,000 barrels. Inquiry at this time indicates that there is little or no gasoline now in storage.

4—Decreased production of crude containing a large percentage of gasoline as partially caused by the Cushing pool.

5—Increase in the price of crude oil, from which the gasoline is made.

6—The recent rapid increases in the prices of crude oil and gasoline have been accompanied by rapid increases in the market quotations of oil company shares. The market values of the capital stocks of thirty-eight corporations, of which thirty-five are in the Standard Oil group and three are typical large independent companies, have increased remarkably in the last 6 months. The stocks of other oil companies probably show a similar rise, but the quotations are not at hand. The thirty-eight companies selected are believed to represent all phases of the oil industry. These rapid increases might be ascribed to the general condition of prosperity and the general upward trend of the stock market but for the fact that during the last quarter of 1915 the oil company stocks did not rise and fall with the market.

For the last 3½ years considered by 6 months periods, the price of crude and the price of gasoline have risen and fallen at the same time, but not always in the same amount. Until the first of last July the percentage of fluctuation of the price of crude was considerably greater than that of gasoline, but since that date the percentage rise in gasoline price has been slightly more rapid than that of crude. Since August 1 gasoline has gone up relatively faster than crude, its rapid rise being uninterrupted by the stationary price of crude during November.

In this report, the cause of the phenomenal rise of the price of gasoline is divided into six headings, as follows:

A brief review of the oil industry will aid in assisting an understanding of the present situation. Pass over the first test wells sunk in Pennsylvania in 1859, the subsequent use of the crude as a medicine and its use without refining as an illuminant in crude lamps to the time when it was discovered that by distillation the crude could be separated into products of higher and lower grades of more or less volatility. This distillation led to better illuminating products, but the more volatile liquids were a drug on the market and for years were turned into the streams until this became a menace to the communities in which the early refineries were located.

Records of the crude oil show that in 1859 it sold for $20 per barrel of 42 gallons, this being the usual size unit. The prices fluctuated between this figure and $3 per barrel up to 1874.

Between that year and 1914, the maximum price reached was $4.23, and the minimum 49 cents. Between 1895 and 1914, the highest price was $2.60 and the lowest price 60 cents. During this period, the price of crude oil showed a steady increase, in spite of temporary fluctuations. New uses were continually being found for the various products of crude oil and the demand apparently kept slightly ahead of the supply, resulting in a steady and healthy increase.

In any study of the crude oil situation, the peculiar fact is at once apparent that the actual production of oil at the wells is unknown, even to the government. The word production, therefore, as used in this paper, refers to marketed production only.

Oil Fields of the Country

The government divides the oil producing sections of the country into ten fields, as follows:

Appalachian Field, including all areas of oil production in southwestern New York, western Pennsylvania, southeastern Ohio, western West Virginia, Kentucky and Tennessee.

Lima-Indiana Field, embracing all areas of oil production in northwestern Ohio and eastern Indiana, as well as a few scattered pools of limited extent in the western part of the latter state.

Illinois Field, including the principal oil-producing area in the southeastern part of Illinois and scattered pools in the south-central and western parts of the state.

Mid-Continent Field, including all areas of petroleum production in Kansas and Oklahoma, irrespective of the character or

Exhaustion of Petroleum Fields

NAME OF FIELD	PRESENT GASOLINE FACTOR PER CENT	ESTIMATED EXHAUSTION OF TOTAL OIL CONTENT PER CENT	PETROLEUM REMAINING IN FIELDS (MILLIONS OF BARRELS)
Appalachian	25	70	481
Lima-Indiana	12	93	31
Illinois	18	51	244
Mid-Continent	18	25	1,874
North Texas	20	8	484
Northwest Louisiana	20	22	124
Gulf	3	13	1,500
Colorado	20	65	6
Wyoming and Montana	20	2	540
California	2½	26	2,345
Total			7,629

grade of oil produced in those states.

North Texas Field, embracing a number of detached pools in Wichita, Clay, Shackelford, Palo Pinto, Navarro and Williamson counties in the north and east central parts of Texas.

Northwest Louisiana Field, including areas of oil production in Caddo, De Soto, Sabine and Red River parishes in the northwestern part of Louisiana, together with adjoining portions of Harrison and Marion counties, Texas.

Gulf Field, embracing a large number of oil pools associated with salt domes in southeastern Texas and southern Louisiana.

Colorado, Wyoming and California fields include all areas of oil production occurring, respectively, in the states named.

Of these, the Mid-Continent has been the most prolific, due to the Cushing pool, while the Pennsylvania oils of the Appalachian fields have always brought the highest price.

In his report, Secretary Lane gives some statistics on the percentage of exhaustion of the various fields and also the quantity of petroleum remaining in these fields.

The table also shows the percentage of gasoline that can be extracted by present processes from the petroleum of these fields. With this as a basis, the probable amount of gasoline that can be produced has been calculated as 892,000,000 barrels. Alaska, Arizona, Utah, New Mexico, Michigan, Arkansas, Alabama, Nebraska, Missouri and Washington are estimated to contain about 75,000,000 barrels of crude. If 16 be taken as the average percentage of gasoline that can be extracted from this oil, 12,000,000 barrels will be added to the total, making it 904,000,000.

Casing-Head Gasoline

There is still another source of supply that has grown at an unusual rate, namely, the production of casing-head gasoline from natural gas. The actual output from this source amounted to 176,804 barrels in 1911, but jumped in 1914 to over 1,000,000 barrels. In 1916 it is estimated that the output from this source will be about 1,600,000 barrels. The future growth of this production is uncertain, being, of course, dependent on the sources of supply of natural gas. Adding, therefore, from this source a rough figure of 30,000,000 to the total, we have 934,000,000 barrels as the supply of gasoline in prospect, unless new and unknown fields are opened or the yield is greatly increased by improved cracking or distillation processes. It is believed that the yield will be enormously increased.

But look for a moment at the consumption of gasoline. The Government figures give the production in 1914 as 34,915,000 barrels, 5,000,000 being exported, leaving 29,915,000 consumed. In 1915 the production increased to 41,600,000, of which 6,500,000 were exported. This enormous increase in exportation of 1,600,000 over the preceding year is of course due to the war. This leaves 35,100,000 as the amount consumed. If the motor car industry continues to grow at anything like the rate now probable, there will be at the end of 1916 approximately 3,000,000 vehicles in use. A conservative estimate of the consumption of these vehicles is 14 barrels per year, which would make 42,000,000 as the probable consumption of the motor car industry alone this coming year. But stationary engines, farm tractors, motor boats and all types of internal combustion engines are also increasing. Assuming the motor car industry consumes two-thirds of the total output, the total demand on the producers for gasoline will be approximately 63,000,000 barrels per annum.

The speculative tendencies of the oil producers is shown clearly by the fact that oil producing shales which can be mined on a safe basis, in much the same way as coal is mined, are practically left undeveloped, the producers preferring the more exciting method, which may be termed the speculative method of boring wells into the oil producing fields. This tendency is clearly pointed out by Dr. David T. Day, of the U. S. Geological Survey.

The United States Bureau of Mines places the value of the petroleum waste at not less than $50,000,000 per year. A considerable part of this waste is preventable, as it is due largely to evaporation. The waste begins at the wells where the natural gas escapes instead of being utilized; in field storage the oil evaporates, and also deteriorates; in the pipe lines some is lost through leakage, and in refining from 3 to 5 per cent is figured as a loss. Better and more economical methods may be devised and it is time that these losses be looked into with serious intent and prevented as far as possible.

Alcohol Offers No Present Relief

Benzol Is a Fuel Possibility and Natural Gas Has Been Tried on Trucks

IT is natural to turn to a substance that can be produced in unlimited quantities; that cannot be controlled by any group of manufacturers and the source of supply of which is cheap and plentiful. Alcohol is such a fuel. Unfortunately, even if there were no Government restrictions concerning its production, it offers no present relief, owing to the fact that for economical use an entire reconstruction of motor car engines would be necessary. Instead of 65 to 70 pounds compression, for efficient alcohol burning, 150 to 175 pounds are required. This at once eliminates it as a fuel for the 2,000,000 vehicles already in use. Under extreme stress and provided the laws were changed, new engines could be produced that will show practically as efficient a performance with alcohol as with gasoline, the horsepower being less in proportion as the thermal units per pound of alcohol are less than in gasoline. Even present-type engines can burn alcohol, but do it wastefully, the consumption per horsepower hour being approximately 50 per cent more than if designed for using alcohol. Under these conditions, alcohol will undoubtedly not enter as a motor car fuel until gasoline, mixtures of gasoline and kerosene or even the lower-grade fuels are either prohibitive in price or exhausted.

Benzol a Fuel Possibility

The prevalent use of benzol in Europe as a motor fuel has led some to expect relief from this source. This hydrocarbon (C_6H_6), which is a by-product of coke, although slightly less volatile than even gasoline of the low grade now in use, nevertheless serves well as a motor-car fuel, it being possible to start on it with the ordinary carbureter and to use it as gasoline is used without any difficult adjustments. Benzol, however, can be obtained in this country only in limited quantities. There is no general or present means of distribution as exists with gasoline or as would exist with kerosene if it were used as a common motor-car fuel.

Approximately 14,000,000 gallons of benzol were produced in coke ovens in the United States in 1915, with a probable output for 1916 of 22,000,000 gallons. Unfortunately, this possible fuel is selling at the present time for 75 cents a gallon and not lower than 65 cents in 1,000-gallon

lots and is in ever-increasing demand in the manufacture of dyes, explosives and carbolic acid.

A ton of coal now yields, by the present processes, about 2 gallons of benzol. The amount of coal used for coke manufacture now averages about 70,000,000 tons annually, which means a possible annual production of benzol of approximately 3,000,000 barrels. Although there is almost an unlimited supply of coal available, benzol would have to be in general use as a fuel for some time before it would be manufactured for fuel purposes alone in excess of the amount produced as a by-product of the coke industry. As long as the war continues benzol is in as great demand as gasoline, and, therefore, offers no relief. However, as it can be produced to sell for even less than gasoline is selling for at the present time and did sell at such prices but a few years ago, it may be considered as a possible future source of part of the fuel supply.

Natural Gas as Commercial-Car Fuel

During the New York show in 1912 a truck on the street was run on natural gas. This was accomplished by gas tanks containing approximately 140 cubic feet of natural gas at a pressure of about 1,500 pounds per square inch, the volume of gas carried being about 412 cubic feet, sufficient to run an ordinary 2-ton truck with load, under average road conditions, from 35 to 45 miles. The gas was said to contain about 23,000 heat units per pound, and to require for complete combustion about twenty-five parts by volume of air to one of gas. This, it will be noticed, is almost three times as much air as is used when burning gasoline in the engine.

Kerosene to the Rescue

As gasoline cannot be produced without producing kerosene, the unprecedented demand for gasoline has caused an overproduction of kerosene. At present kerosene is being stored in vast quantities, and means for disposing of it are being sought by the refiners, as shown by advertising campaigns on kerosene with special trade names. During the Boston show such a campaign occupied full pages in the daily papers. What is known as "commercial gasoline" contains 10 per cent of benzine, naphtha, and 10 per cent of light kerosene.

Much to the sorrow of the motoring public and of truck users, the oil companies have gradually been supplying as part of commercial gasoline even a part of the heavier kerosene, so that the industry has been forced even while burning gasoline to provide suitable carbureters and heating devices to handle this mongrel fuel, which, instead of showing 72 to 76 degrees test, is often as low as 54. Practically none of it is over 60. Commercial kerosene contains 35 per cent of medium and 10 per cent of heavy kerosene.

Next in the order in which the products distill over are lubricating oils, 10 per cent; cylinder oils, .05 per cent; vaseline, .02 per cent, while 16 per cent is commonly considered as loss by the refiners of petroleum.

Problems in Using Kerosene in Engines

Necessity of Heating, Combination Valves for Two Fuels—Carbureter Requirements

MANY experiments have been made to determine the possibilities of using low-grade fuels. Nearly all of these have shown that they can be used under proper conditions, but it is difficult for the ordinary motor car user to get satisfactory results from non-volatile fuels. Clogging up or loading up takes place whenever the engine is too cold, due, perhaps, to coasting or to the engine having stood for some time.

Often when the engine is throttled the fuel seems to condense, load up the intake pipe and occasionally flow back into the carbureter. When the throttle is then opened this excess fuel is drawn into the cylinders, as shown by clouds of smoke, and results in carbonization.

The difficulty of starting the engine is perhaps one of the greatest. This requires gasoline or the use of some outside heating device to vaporize the fuel. These seem to be the only alternatives, with perhaps the one exception of some device that actually ignites the fuel while in the carbureter, as mentioned elsewhere in this paper.

Tests by P. S. Tice show that a starting-mixture temperature ranging from 170 to 250 degrees Fahrenheit, depending upon the richness of the mixture, is necessary with kerosene, the higher temperatures being required for the leaner mixtures. These tests also indicate that the fuel consumption decreases as the temperature increases up to 160 degrees Fahrenheit for the running temperature of the mixture itself, and furthermore, that steady running can not be obtained with a mixture temperature of less than 100 degrees Fahrenheit.

In the tests the heat was obtained from an electric heating-coil surrounding an 18-inch length of .50-inch outside diameter copper tube, the bore of which was 0.4375 inch. This tube was attached at its upper end to a simple T manifold, while its lower end was adapted to take a series of throat pieces of Venturi form. The sizes of the throat openings determined the capacity of the carbureter and the relative amount of fuel discharged was determined by the closeness with which the jet outline was made to approach the point of greatest air-passage constriction through the throat piece. The kerosene used in these tests was 0.817 specific gravity and the heating coal consisted of 40 feet of No. 18 Nichrome resistance wire.

The results of such tests indicate the possibility of starting direct on kerosene, provided makers are willing to devise and provide the public with suitable vaporizing mechanisms. The electric lighting and starting, which is a part of the equipment of every high-grade machine today, gives a ready means of obtaining sufficient electric current for such purposes. However, in spite of these facts, I do not know of any car now being offered that makes possible the use of kerosene. If such vaporizing devices are installed they must be automatic.

Thermostatic Control of Heating Coil

The objection that such a construction would complicate the design is more or less invalid, as makers have shown no hesitancy in adopting devices that better performance even when they complicate the design. To make such a vaporizer automatic and to take care of all conditions that may arise, under which the special heating of the carbureter will be necessary, some form of thermostat must be installed to care for the switch operation. Thermostats are now in use on eight- and twelve-cylinder engines to control the water circulation. These give practically no trouble; in fact, the average user does not know of their presence. Such a thermostat might be placed in control of the switch for the vaporizer heating-coil, so that whenever the temperature fell below the point at which the kerosene will properly vaporize, the thermostat would automatically throw in the switch or control a solenoid for this purpose and thus provide the necessary heat. The temperature could be so set that the coil would begin its work before the temperature became too low, so that there would be no period during which the engine would load up.

If a vaporizer is not used, gasoline can always be used for starting, and the design of the manifold can be such as to supply the necessary heat after the engine is started. This again complicates the matter, as a separate tank must be supplied for the starting fuel, but this can be a small tank on the dash in view of the operator. Again, automatic control should be provided. It should not be necessary for the user to turn on the gasoline petcock, but this should be done by a thermostat without paying any attention to it.

In the same way, as soon as the engine gets up to the proper temperature at which it will care for the lower-grade fuel, the heat acting on the thermostat should automatically shut off the gasoline tank and turn on the kerosene. At this point, when both fuels are entering, there may be, of course, with the single adjustment of the carbureter some overloading or storing up of excess fuel, which for a few revolutions may cause smoke, but this is one of the details which, in all probability, will be taken care of by refinement in de-

sign, if any such method is eventually employed.

One maker has placed on the market a combination valve that will enable any user to turn on as much fuel from one tank as he desires for combining in any desired proportion with that from another tank; for instance, a tank of kerosene and a tank of gasoline can be used, and these two fuels used separately or mixed in the desired proportion. The entire fuel supply can be shut off at will from the steering wheel to which the device is clamped.

The manifold is also important, this being the only portion of the engine proper that needs redesigning. Owing to the tendency of low-grade fuels to separate and leave a sticky, tarry residue, especially when heat is applied, any exhaust manifold used for heating the fuel should be so designed that it can be readily cleaned. Such manifolds are already on the market for use on the Ford car and are sold complete, together with a carbureter for handling both gasoline and kerosene, the combination displacing the exhaust manifold and the present carbureter.

The intake manifold must be short. This is to prevent condensation of the fuel from the mixture on its way to the engine. For the same reason, it should be lagged.

A special type of carbureter must be used. It may be necessary to heat the fuel in the carbureter or to heat the air so it will vaporize the kerosene more readily and prevent condensation. Direct heating, if carried too far, has a tendency to pre-ignite the fuel, especially if it is close to the flash point, and also to cause it to separate into its various grades, the most volatile passing over first, leaving an undesirable residue in the carbureter.

The introduction of slight quantities of water vapor with the fuel is well known and has been experimented on for many years. Its beneficial effects are recognized and some device for this purpose should form a part of every carbureting mechanism. It slightly reduces cylinder heat, delaying or prolonging the combustion, somewhat reduces the maximum cylinder pressure while keeping up the expansion curve or increasing the mean effective pressure. In other words, it fattens out the indicator diagram, which shows as a result a greater work area. Water vapor in proper proportion makes for fuel economy, longer life of the engine and less carbon.

Getting More Gasoline from Petroleum

Development of Burton and Rittman Processes May Increase Motor Fuel Yield

A POSSIBLE method of increasing the present supply of gasoline lies in a further development of the cracking process which was invented by Dr. Burton, chief chemist of the Standard Oil Co., of Indiana. Four or five years ago Dr. Burton started distillation of gasoline in pressure stills in which a pressure of approximately 75 pounds is used. Two years ago nearly of these pressure stills were in operation at the Witney, Ind., refinery of the S. O. Co. of Indiana, and today this system of pressure distillation is being taken up by many of the thirty-five S. O. companies. By pressure distillation Dr. Burton gets an additional 9 per cent out of the crude. This has been a big factor, when you consider that it means nearly doubling the quantity of gasoline obtained from a gallon of crude.

A still further step in this cracking process, or pressure distillation has been taken by Dr. W. F. Rittman of the Bureau of Mines, Washington, D. C., Dr. Pittman uses a pressure of 350 pounds and his process differs in several details from the Burton process. The Rittman process is claimed to double the quantity of gasoline obtained from a gallon of crude. This process is yet a laboratory one and is not in practical operation like the Burton process.

Dr. Rittman was present and states that in investigations he had made he had collected samples of gasoline distilled from the crudes in all the different fields. The difference is amazing and the variation no doubt explains much of the trouble that has been had in vaporization. One company, for instance, sold four different kinds of gasoline. This concern used kerosene as a base and added casing head gasoline to bring it up to the required grade.

"America has not unlimited supplies of fuel," continued Dr. Rittman, "Shale oil does not hold great possibilities. It is hard to get it and in Scotland it has only been possible because of the value of the ammonia also obtained. Now that much of this ammonia is being supplanted by the methods for extraction from the atmosphere it is going into further disuse. Benzol and toluol are out of the question."

Dr. Rittman referred to the cracking process as having been developed by Dr. Burton and stated that if it were not for these processes, gasoline would be selling for 5 cents more per gallon than it does now. He predicted that gasoline would continue to rise until the cracking process or the use of kerosene are able to catch up to the demand. The cracking of crude oil is a reality. Great numbers of intelligent men are now working on the problem and there can be only one result. There are two sides to the question, one is the chemical and the other is the mechanical and with both chemists and practical mechanical men on the job at the same time there can be no doubt the solution will soon be reached.

How to Treat a Molecule

He pictured the molecule of crude, stating that the further down in the vaporization scale we go the larger become the molecules. When there is no restraint on this larger molecule it breaks into smaller molecules of gas, but by applying proper restraining influences it can be broken into gasoline instead. The reason he gives for operating his process in the gaseous state is that in this condition it is possible to secure any variations of pressure and temperature. There was a time when crude carried the gasoline price but today gasoline carries the price of crude.

Regarding the matter of competition, Dr. Rittman said that the small producer has been forced to put up the price simply because he could not afford to store the crude oil and consequently had to pay for it on a rising scale. He predicted, furthermore, that the price may go to 40 cents or only to 35. Regarding the percentage of gasoline which today is made by the cracking process, he stated that it did not exceed 15 per cent and consequently was not enough to offset the rising tendency.

Distribution of petroleum in United States, showing how the fields are located

W. A. Williams, chief petroleum technologist of the Bureau of Mines, also present, stated that at the present time we have exhausted about one-third of the visible supply of crude. At the present time, of the products manufactured 20 per cent are being exported, 25 per cent are being burnt under boilers, and another 20 per cent sold for cost of production. The better use of the remaining two-thirds is the stepping stone to immediate relief. We are producing now 20,000 barrels less crude than in 1913 and 40,000 less than in 1915. The 1915 production was particularly rich in gasoline, due to the Cushing pool. There are possibilities in Kansas. Two fields have been discovered, which have been very productive although later drillings show less oil than was indicated in the first borings.

Mr. Williams stated that in some places as much as 50 per cent of the crude oil is left in the sand. This wastage is now being eliminated by the use of water and other methods. The wastes in the Cushing field were eliminated largely by improved drilling which enables the operators to secure the crude practically without waste.

Another interesting reference made by these speakers was the possibility of local fields caring for local demand. For instance, the California situation, or that of the Pacific coast, can be taken care of by California production. The necessities of the Rocky Mountain district can be met by the production of the Wyoming and Colorado fields, while the big demand of the Eastern states should be met by the great mid-continent fields which produce 75 per cent of the refinable oils.

Casinghead gas, according to Mr. Williams, probably never will amount to more than 10 per cent of our fuel. Probably the cost of this will go up until the supply catches up to the demand, and this is the case throughout the entire gasoline situation.

Use of Kerosene Considered Possible

University Man States Two Fundamentals for Low-Grade Fuel Carburetion

CHARLES E. LUCKE, of Columbia University, spoke of the practical development of means for using the lower grade fuels such as kerosene. According to him, the subject of devices of a mechanical nature to meet the problem have been studied intensively during the past few years and that, while hundreds of schemes had been submitted, there is fundamentally no difficulty and the final results will not differ much from present types. In fact, he expressed himself as being surprised at the delay in reaching some definite conclusion on the problem and stated that in his belief the difficulties to be overcome are, first, unwillingness to take trouble; second, the patent situation; and third, the problem of making a proper mixture of kerosene and air.

Regarding the first, kerosene as a fuel is fundamentally different from gasoline and therefore fundamentally different means of vaporizing it must be used. "An engine," he stated, "need not start on the first turn nor yet on the second or third, as long as a satisfactory start is obtained. It is merely a case of changing from the familiar to the unfamiliar."

In regard to the patent situation, there are thousands of devices of all sorts, of which all are defective. In making the final kerosene carbureter, it would possibly be necessary to make element A from one patent, element B from the next patent and this of course renders the situation complex. The final device must be worked out on proper thermo-chemical lines directly proportioned.

Prof. Lucke stated his belief that the problem of making a proper mixture of kerosene and air is not difficult. The engine is a variable-speed and variable-power machine. It is a multi-cylinder engine and to make a mixture from a single header equally distributed under all conditions of weather, temperature and density, may seem quite difficult Practically, however, it is not insurmountable. Such mixtures can be vaporized. Measured supplies of kerosene and air can be brought together and by proper heating a dry mixture result. Therefore, the problem consists in arranging a proportioning device and securing the proper temperature. This also is not difficult, for while it is true that the temperature must not be too high or too low, the range is not less than 100 degrees. Therefore, it is only a question of having first the correct proportion and secondly, the correct heat supply.

Given these two conditions, the machine will run, but will not perform engine for engine like the power plants of today. Car for car there will be no difference.

An important point brought out by Prof. Lucke is the necessity for intimately associated mixtures. An intimate mixture will vaporize at 300 degrees Fahrenheit readily, while one not so closely intimate under the same conditions will not vaporize at 500 degrees. In fact, close to 200 degrees is good enough in some correctly designed headers with proper intermixture. It is simply a question of simple design and of following the laws of vaporization.

Harry Tipper, advertising manager of the Texas Co., stated that in his practical experience he had found plenty of competition in the oil field, and that the market has never agreed. He also stated that the term gasoline was never used by men in the oil business, as it was only a word coined when the more volatile fuels were used for lighting purposes; it never represented a definite cut. Gasoline never meant the same to two companies while kerosene is a more standardized product. New York state requires a definite flash point in an Elliot tester in order that the name kerosene may be used to define the product.

Regarding kerosene, Mr. Tipper said that since it was made when gasoline is made, what can you do with it unless you pay for it with the gasoline? The small refiner suffers and must use the kerosene in order to get rid of it and he cannot afford to store it.

"Do not magnify the part that fuel plays in the cost of running," said Mr. Tipper. "It is only a small percentage after all. Motor cars were operated successfully in Europe when 35 cents was paid for a gallon of gasoline and I remember riding in a taxi for 25 cents a mile at that time. Kerosene is the real answer to the fuel proposition."

Dr. Rittman stated that Mexico holds no hope, unless it is from the cracking process but that with this there is room for considerable optimism, since whereas only 5 per cent of the Mexican crude can be refined into gasoline by straight distillation 40 per cent is secured by the cracking process.

The first distillate station in Phoenix, Ariz., has been opened by the Southwestern Carbureter Co., which is urging motorists to install Master carbureters and use distillate instead of gasoline. Distillate retails at 17½ cents per gallon in Phoenix and gasoline at from 22½ to 25 cents.

ASKS THAT U. S. BUY OIL LANDS

Washington, D. C., March 18—The latest scheme to bring down the price of gasoline has been brought out by Congressman Randall, of California, who has introduced a resolution in the house asking the secretary of the interior to give his opinion on the purchase by condemnation proceedings of the entire oil-producing area of the country. The resolution further asks for a report on the advisability of having the Bureau of Mines establish oil-pumping plants for making gasoline by the Rittman process.

Crude Advances Third Time

Chicago, Ill., March 21—The third advance that has occurred during March in the crude oil prices prevailing in the Oklahoma and Kansas fields was announced several days ago, the present price being $1.55 per barrel. Early in March the price was $1.30. The successive increases have been 10 cents, 5 cents, and the latest one, 10 cents. A representative of one of the Standard Oil companies said today that further increases are probable, meaning that gasoline prices will climb up also.

Chicago and New York quotations on gasoline remain unchanged this week. The New York figure holds up to 24 cents, tank wagon prices, and ranges upward. Chicago pays 20½ cents and upward. Jersey City, N. J., is paying 23 cents; Boston, Mass., 25 cents; Connecticut cities, 24 cents. aKnsas City, Mo., pays 1 cent more this week, as does Denver, Colo., the prices being respectively 18.8 cents and 24 cents.

25-CENT GASOLINE FOR NEW OWNERS

New York, March 18—Purchasers of motor cars from the C. T. Silver Motor Co., New York, after date of March 20, will receive with each new car a ticket entitling the owner to buy gasoline at a regular price of 25 cents per gallon from any one of the branches of the company or at its main store on Broadway. Branches are maintained in Brooklyn, the Bronx, Yonkers, and Newark, N. J. This inducement to prospective buyers of motor cars was decided upon by Mr. Silvers as a means of giving assurance to new customers that their expenditures for gasoline will not be constantly increasing.

LEAGUE'S OFFICER ADMITS FRAUD

Uniontown, Pa., March 18 — Following the indictment of A. C. Bidwell, president of the International Automobile League, and F. A. Chapman and Harry Ames Van Auken, vice-presidents of the league, by the grand jury of Fayette county, one of the men, Chapman, pleaded guilty on the charge of conspiring to cheat and defraud C. W. Johnson, of the Standard Automobile Garage, and others. Evidence was gathered by Mr. Johnson and his attorneys to show that the league and its representatives secured sixty motor car owners and garage men of Fayette county to become members of the organization at a cost to themselves of $3,500.

The court suspended sentence in the instance of Chapman, it being shown that he did not have full knowledge of the league's operations. He will be required to remain within the jurisdiction of the court for 2 years and was assessed the costs of the hearing. Van Auken was apprehended in Valdosta, Ga., and extradition papers obtained for his removal to Pennsylvania.

Mr. Johnson is the same who made a name for himself last summer by driving his Packard greyhound up the mountain at Uniontown and beating Ralph de Palma.

BATTERY COMPANY REPORTS

Philadelphia, Pa., March 18—The Electric Storage Battery Co., this city, for the year ended December 31, 1915, had gross sales of $1,770,188 as compared with $1,395,793 in 1914. The 1915 income, amounting to $1,360,748 was equal to 8.37 per cent on $16,249,425 capital stock, compared with $1,103,237 in 1914 which was equal to 6.78 per cent on $16,250,000 stock.

Shall We Discard the Differential?

Timken-Detroit Man Tells of War Ambulances Without Equalizing Gear

DETROIT, March 17—Before the usual large crowd that overflowed the convention hall of the Pontchartrain hotel, J. G. Perrin, chief engineer Timken-Detroit Axle Co., read a paper on the Evolution of the Rear Axle, and provoked a spirited discussion of a topic that is of utmost importance today. Much interest was displayed in the hints that before long we may have cars without differentials, as experiments are now being conducted along this line.

Previous to the reading of the paper of the evening, a constitution, by-laws and rules were adopted for the Detroit Section. Up to this time the section has operated with no constitution and by-laws other than those of the national S. A. E., and the action simply puts the section upon a firmer business basis.

Some of the pertinent points brought out by Mr. Perrin in his paper follow:

Perrin's Paper

The axle and wheel are components of the modern motor car that have always had some equivalent in vehicles since the rolling type succeeded the sled as a medium for transportation. Since the axle has always been in existence the present form is a matter of development and evolution rather than invention.

In some of the earlier forms of motor-propelled vehicles a belt or chain was used for transmitting the power from its source to the driving wheel. Due to the number of parts, the difficulty of arranging a satisfactory form of housing for the chain, and the loss of power from belt and other forms of friction drives, these systems have been succeeded by some type of positive gear drive.

On pleasure-car work the bevel-gear axle has up to this time been an example of the survival of the fittest, although the worm is favorably considered when low gear reductions are required.

The load-sustaining portion of the rear axle has passed through a greater number of stages of development than any other part of the unit.

Until about 2 years ago the straight-tooth was the prevailing form of bevel drive gears. With such improvements in engines and transmissions that these units operated more quietly the difficulties became greater in getting straight-tooth bevel gears as noiseless as the trade demanded. This condition was aggravated by the increase in production which made it important that the gears operate as noiselessly as possible with a minimum of adjustments, fitting and trying after a chassis was put on the road. Then the gear reductions, on account of greater range of speed on direct drive, necessitated either small pinions or larger driving gears. These again added to the difficulties of getting quiet gears. A solution of this difficulty was sought in two directions—the use of the spiral bevel and of the worm gear.

Recently the positive-drive form of differential in which the drive is taken on the wheel giving the best traction has been developed commercially in several forms. The elimination of the differential is a possibility suggested from experiments a number of people are now conducting on both commercial and pleasure vehicles.

The subject is sometimes brought up regarding the effect on axle design of the use of high-speed six-, eight- and twelve-cylinder engines of small bore. When practically the same chassis as regards passenger-carrying capacity is used, the substitution of these engines for the larger-bore engines of a smaller number of cylinders has resulted in no change in the fundamental dimensions of axle as regards size of driveshaft, bearings and driving bevels.

The possibility of running axles without differentials was dilated upon. Mr. Perrin said that it is being experimented with all over the country. In Europe they are running some of the ambulances without differentials, and they find that the efficiency of the truck is increased a great deal, as regards straight-ahead going. The only limiting factor, so far, has been the short turning radius, as trucks so equipped cannot turn around in such close quarters as conventionally built types, because the friction of the parts is too great. The binding effect in trying to turn around in too short a circle has been too great to be satisfactory on the rough ground. One prominent electrical concern building electric cars, said Mr. Perrin, has tried the non-differential construction in New York City and found that the ampere draw with and without differential was practically the same.

F. E. Moskovics, Nordyke & Marmon Co., said that he noticed several concerns are in the habit of making differentials without adjustment, and asked for the comments of the author of the paper on this subject. Mr. Perrin said that the other arrangement that would have to be used, if there were no screw adjustment in the meshing of the bevel gear, is the fitting of variable thicknesses of spacers back of the pinion, back of the main bevel gear. That has been tried, he said, and it is continued today in some cases, and while it is perfectly feasible in small productions, it has not proven a commercial possibility in large outputs.

INTER-CITY TRUCK DELIVERY

New York, Mar. 18—New York and Philadelphia, just 94 miles apart, are now connected by a daily motor truck service available to all shippers. This service has just been established by George W. Mink, of Philadelphia, and the power mediums used are three 5-ton Pierce-Arrow motor trucks.

Difficulties in handling promptly by railroad freight the large volume of shipping between the two cities have been greatly increased by the volume of war munitions now being moved daily. A situation of congestion exists that is without precedent. It is hard to get delivery on time regularly.

This is the first experiment on an extended scale in this section with a regular daily schedule of runs. It is planned to still further enlarge the service so as to facilitate shipment to and from New England. Arrangements have been made with a New York firm to have merchants ship from Boston to New York by water, and thence to Philadelphia by motor truck. It is planned with the growth of the service to extend it till a whole fleet of trucks are in use.

The Motor Car Repair Shop

Finding the Speed of Your Engine

Process by Which One Can Tell Motor R. P. M. from Miles Per Hour Traveled

THE more a man learns about the motor car he drives, the more he wants to know. At first he is content with the simple knowledge of how to drive it; later he takes pleasure in doing small jobs of repairing, and as he gradually becomes more and more of a motor car mechanic he delves deeper into the internal workings and the theories back of them. That is probably one of the reasons why Motor Age is constantly receiving inquiries as to the gear ratio of certain makes of cars. Knowing this, the motorist proceeds to figure out how fast his engine is running when he is getting a given speed out of the car.

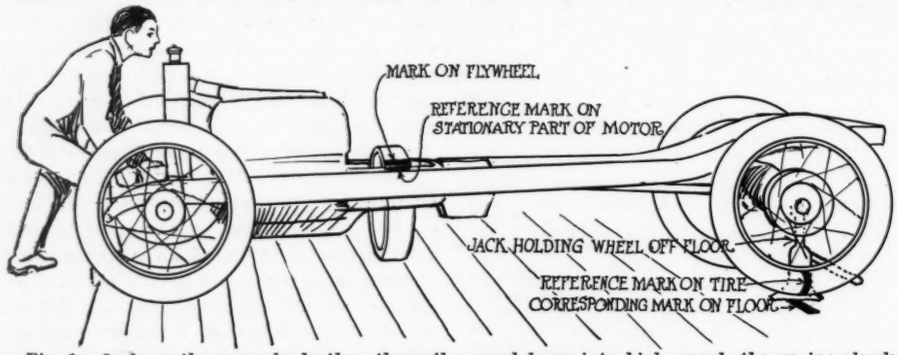

MARK ON FLYWHEEL
REFERENCE MARK ON STATIONARY PART OF MOTOR
JACK HOLDING WHEEL OFF FLOOR
REFERENCE MARK ON TIRE
CORRESPONDING MARK ON FLOOR

Fig. 1—Jack up the rear wheels, then throw the speed lever into high, crank the engine slowly by hand, counting the number of times the engine has to be completely turned over to complete one revolution of the wheel. First make a reference mark on the flywheel, or take one of the timing marks as a reference. In this way count may be kept easily of the number of revolutions of the engine

So for the edification of these investigating souls, it seems advisable here to explain how to figure out the engine speed, etc., when certain factors are known. By the gear ratio we mean the number of revolutions of the engine crankshaft per revolution of the rear wheels driving in high. This shows what the gear reduction is between motor and wheels, and in the modern car this reduction is obtained between the driving pinion and ring gear in the rear axle. If we say that the gear ratio is 3½ to 1, for instance, we mean that the crankshaft has to revolve three and one-half times to one revolution of the wheels. If we step down to a lower gear in the gearbox then the engine has to run even faster for the same number of revolutions of the rear wheels, for then we have not only the reduction at the rear axle, but also a reduction at the gearbox.

Suppose we know that the car is fitted with 32 by 3½-inch tires in the rear, and that the gear ratio is 4 to 1. How are we going to determine the speed of the engine in high gear when we are running at 30 miles per hour, say? The first thing to do is to reduce the wheel diameter to feet instead of inches, and dividing by 12 inches we have 2.66 feet. Now each time the wheel revolves, a distance equal to the circumference of the tire is covered, therefore multiplying 2.66 by 3.14 we have the distance per wheel revolution, or 8.35 feet. The car speed is 30 miles per hour, which is equivalent to 2,640 feet per minute. You get this by multiplying the miles per hour by the number of feet in a mile and then dividing by 60 minutes. Then, knowing the number of feet covered in 1 minute and the number of feet per revolution, the revolutions per minute of the wheels can be determined by dividing 2,640 by 8.35, giving 316 r.p.m. But the engine runs four times as fast as the wheels, so the engine speed is 1,264 r.p.m.

It is a rather good thing to know how fast you are running your engine when your speedometer indicates a certain mileage, and knowing this, you are more apt to treat the motor with consideration. If a car with the specifications above were capable of 60 miles per hour, you can see that the engine is running well over 2,000 r.p.m., and that is considered a pretty high speed even in these days of high speed engines. From the foregoing the reason for the lowering of the gear ratio with the higher speed engines is brought out also. These engines run at higher speeds than our former motors did at any given car speed, and the lowering of the gear ratio takes care of the difference.

Sometimes the gear ratio is not known, and in that case it can be determined in one of two ways. You can do it mathematically if you happen to know the speed of the engine at any given speed of the car, by simply working the computations backwards. For instance, supposing it were known that when the car is traveling at 20 miles an hour the engine is running at 1,000 r.p.m., and that the car is equipped with 34 by 4 tires. In this case you would proceed to determine the revolutions per minute of the wheels in going 20 miles an hour, this figuring to 197 r.p.m. Dividing 197 into 1,000, you would find the ratio to be 5.07 to 1.

But if you did not even know any relation between the speed of the engine and the speed of the car, there is another way of arriving at the ratio approximately. This is to jack up one of the rear wheels, as shown in Fig. 1, and then after throwing the car into high gear crank the engine slowly by hand, counting the number of times the engine has to be completely turned over to one complete revolution of the wheel. First make a reference mark on the flywheel, or take one of the timing marks as a reference, and after bringing this directly under the pointer, if there is one, or some other reference point on the flywheel housing, make a mark on the tire and another directly below this on the floor. Now turn the engine slowly, and when the rear wheel is again in line with its floor mark, count the number of times the flywheel has turned. If it has taken 3½ revolutions of the engine, the ratio is 3½ to 1, and so on.

Gravity Test Not Sufficient

It is a mistaken notion that a great many motorists have that the gravity test of a gasoline is proof positive of its quality. It cannot be determined correctly by this test alone, although the gravity is one of the factors that spell a good or a bad fuel. Practically all oil companies specify the gravity as a certain number of degrees Baume, but this alone is not a true indication as to whether or not it vaporizes readily and has commendable fuel value. Then, too, the locality from which the basic crude oil came may have some bearing upon the quality of the gasoline, its gravity and fuel possibilities.

The refiners frankly admit this and even go so far as to show clearly why such is the case. The Platt & Washburn Refining Co. explains the matter as follows:

"As an example, let us make a mixture by pouring together equal parts by weight, of a gasoline of 80 degrees Baume and of a kerosene of 40 degrees Baume. The resultant mixture will have a Baume gravity of 60 degrees, which would be considered a fair gasoline, if judged only by its

gravity. This mixture will not prove altogether satisfactory when used in the motor car engine, and it is apparent that some other comparative test is necessary when judging the true characteristics of a fuel.

"A really practical test, which shows at once the volatility of liquid fuel, is the determination of the boiling point limits of the fuel. This test consists of observing:

1—The initial boiling point.
2—Per cent of volume distilling over at several intermediate temperatures.
3—The final boiling point.

"It may be remarked that gasolines are not simple compounds like water, but are physical mixtures of chemical compounds of carbon and hydrogen, each compound having different boiling points.

"In general, the higher the initial and final boiling points the more difficult will be the starting of the motor on cold mornings. Much more heat will be needed for warming the mixing chamber of the carbureter, or the inlet air which passes through the carbureter. And, since preheating of carbureter or motor when starting is impractical, more or less difficulty will always be experienced with a cold motor when using a high boiling point fuel."

This opens up a new line of thought for the average man who drives a car. He has been accustomed to thinking that just because the gasoline has the same gravity it is just as good no matter where he gets it. He often wonders why he has more trouble with some that he buys than he has with that which he gets at another point of supply, and generally when the motor does not work as well as he thinks it should he lays the trouble to the engine, or to the carbureter, when in reality it might be the fuel. So the best way to do is to buy gasoline at the supply station whose fuel seems to work best in the motor. Perhaps in warm weather the variations above referred to in the quality of the fuel will not be so apparent in the general running of the engine, but in chilly weather they are most likely to make themselves known.

At the present time the average gravity of gasoline supplied is from 60 to 62 degrees Baume, but as this is actually so small a determining factor, it is not necessary to be overly concerned over the gravity test just so long as the fuel you use seems to be of the best advantage, relatively, in your motor. Generally speaking, too, a motor that is not very effectively cooled can use a less volatile fuel to more advantage than can the engine that is efficiently cooled.

French Women Make Munitions in Car Factories

(Concluded from page 9)

models only is not looked upon as particularly bright for the period immediately after the war. It is known, indeed, that one of these firms is contemplating the construction of motor trucks, a class of work to which it has never previously paid any attention. At the end of the war several thousand big cars, varying from 16 to 30 horsepower, will be turned on the second-hand market, and these are bound to have a disturbing influence on the higher class car trade.

Some Twin Sixes

A few twin-sixes are under consideration, but it is rather significant that the only firm which is at present certain to produce a twelve-cylinder car is making arrangements for the bulk of its output to be 10 horsepower two and four-seater light cars. Considerable experience in twin-sixes is being gained on aviation work, with the possibility of some really good motor car engines with this number of cylinders.

The British motor industry never has had to face important competition from Germany and is likely to have less after the war. Public opinion is alone quite sufficient to prevent the sale in England or her colonies of the leading German cars. The situation is not the same with regard to magnetos. In 1913 Great Britain imported magnetos to the value of $100,000, and of this amount Germany was responsible for $95,000.

Since then conditions have changed, all ought to get the magneto industry into her own hands, but there has not, as yet, been any comprehensive scheme towards this object. The English factory of the Bosch company is being worked for the benefit of the British authorities, supplying magnetos for aeroplanes, trucks and automobiles.

English Making Magnetos

A few of the English electrical firms have taken up magneto construction, the most important development being the Thomson-Bennett Co., of Birmingham, which is an auxiliary of the powerful Lucas Co. There is a hesitancy about putting money into the magneto business until definite guarantees are given of a protective tariff for a minimum number of years. The government commission appointed to inquire into this question has proposed a 33⅓ per cent duty on all foreign made magnetos. If this is adopted, and there is little reason why it should not be put into effect, German magnetos would certainly be driven out of the British field. There are no indications in England, or anywhere in Europe, that the use of the magneto will be lessened by reason of the present situation. Electric lighting and starting will be found on all European after-the-war models, but this is not likely to supplant the separate magneto for ignition purposes.

The bulk of the aeroplane motor construction is in the hands of eight motor car firms, of which five are building V-motors and the three others various types including Vs. Although every type of motor is in use, including Gnomes, eight-cylinder air-cooled, eight-cylinder water-cooled, six-cylinder vertical water-cooled, and twelve-cylinder water-cooled, the tendency is towards the V water-cooled motor with eight or twelve cylinders. Power is increasing, the opinion holding that comparatively few motors will be produced of less than 200 horsepower. For hydro-aeroplane work numbers of twelve-cylinder motors developing 300 horsepower and more are being produced.

The most important of these is a twelve-cylinder of 100 by 160 millimeter, 4 by 6¼ inches, bore and stroke. This change from 75 to 80 horsepower motors running at 1,200 revolutions to motors of 100, 150, 200, and even more than 300 horsepower, running at 2,000 revolutions and having a geared-down propeller, is one of the most important developments in connection with the motoring industry.

Aluminum Cylinder Aviation Engine

In France, the Peugeot company and other factories working in conjunction with them are producing thousands of eight-cylinder V-motors the direct outcome of racing practice. In England the 12-cylinder Sunbeams for aviation work have been made possible only by reason of racing experience.

The aviation motor which is attracting the greatest amount of attention is the eight-cylinder Hispano-Suiza now being built in England. This motor is probably the first aluminum cylinder engine to be built in any quantities. It was first produced more than a year ago at the Barcelona factory of the Hispano-Suiza company and brought before the French authorities who decided to adopt it and had it built in the main factory of this company at Paris. It has since been taken up under license by other firms in France and more recently has been secured by the British government.

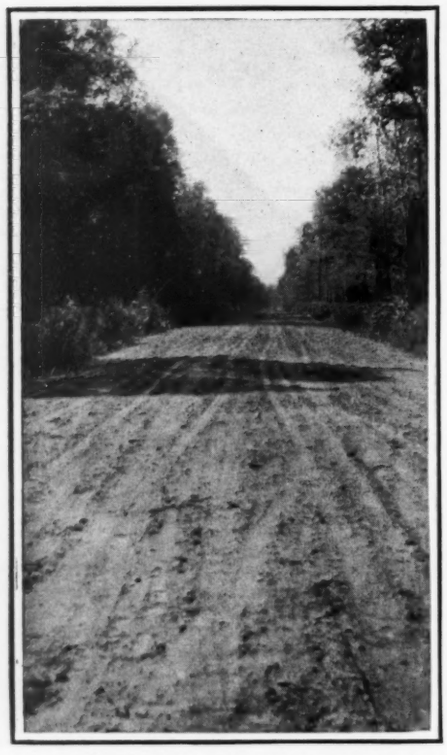
This motor has its cylinders cast in groups of four with steel liners inserted. A detachable cast-iron head carries the valves—two per cylinder—and the overhead camshaft is driven by bevel gearing and a vertical shaft at the front end of the motor. One of the patented features of this motor is the direct operation of the cams on the valve stems, without any intermediate mechanism. There is a separate carbureter for each group of cylinders and lubrication is under high pressure to all parts, with the oil passing through a radiator.

This motor drives the propeller through spur reducing gears. With a bore and stroke of 4¾ by 5⅛ the motor weighs 363 pounds when equipped with two magnetos and a duplex carbureter.

Official aeroplane motor tests are now very severe. The French authorities demand 50 hours' constant running, half of this at three-quarter power and half at full power. The British put all motors through a 100-hour test before accepting, and in the case of big units make them run at the end of the 100 hours with the propeller out of balance for a short time.

"Cloverland"—Michigan's Northern Peninsula, Has Good Roads

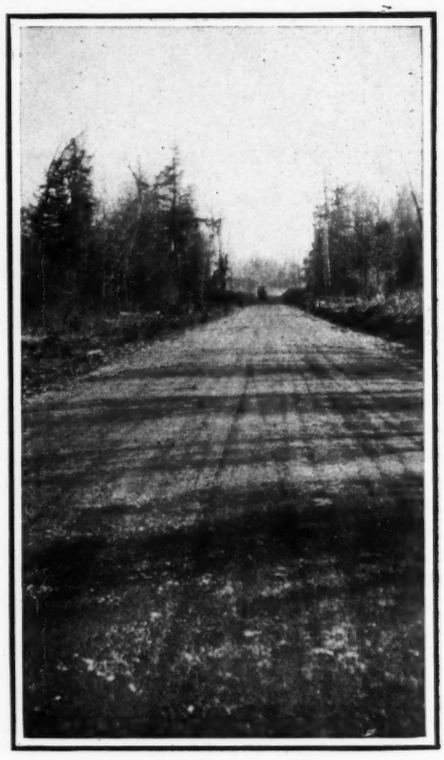
Right-of-way cut through dense Michigan timber and as it appeared after being logged



Appearance when grade was finished—

Seeks to Become Northern Terminus of Dixie Highway and Make Route from "Salted to Unsalted Sea"

CLOVERLAND—Michigan's upper peninsula—is developing a road system that can not be excelled for quality of construction. The illustrations herewith give a good idea of what the road engineers have had to encounter, and are fair examples of usual conditions in upper Michigan. The road from Iron river, through Gogebic county, is all new construction and goes through a country that was practically virgin forest before the work started. The road is 1,750 feet above sea level and the right of way is 66 feet wide. All culverts and bridges are reinforced concrete and the roadbed has a minimum width of 22 feet and a maximum grade of 6 per cent. The greatest curvature is 10 degrees and the metalled surface has a minimum width of 16 feet. A. L. Burridge, engineer for the Iron County Road Commission, Crystal Falls, Mich., has laid out trunk lines and now there is a good network of roads, suitable for good motoring throughout Cloverland—Editor's note.



—And after surface was metalled

MENOMINEE, Mich.—Editor of Motor Age—Before and after the run was made from Chicago to Miami, known as "The Dixie Highway Run," there was considerable agitation in the Chicago newspapers and the newspapers south along this route, but there seems to be a drouth of support and no inclination on the part of the papers north of Chicago to indorse this project.

I attribute this largely to the fact that the proper point of departure for the Dixie highway should be at Ft. Wilkins, Mich., the utmost northern point of Keweenaw county, which is in Cloverland the upper peninsula of Michigan.

Fort Wilkins, established in 1843, proved useless, except as a precaution. On several occasions alarms were spread of an uprising, but they were brought in from outside. At one time it was reported at Eagle river that runners were seen going up and down the eastern shores, evidently summoning the tribes to war. The settlers were not particularly concerned, but the authorities of the state sent up a supply of guns for use in an emergency. They were old-fashioned flint lock guns, even then a little out of date, but evidently not entirely useless, for they were bought by John Senter, and when the first military company was organized at Calumet they were sent hither. The old flint locks are now stored at Eagle Harbor, and also the bayonets, once an indispensable adjunct to war rifles.

This fort is somewhat conspicuous in Michigan history as it was established 74 years ago, and the buildings are almost perfect, and stand as a monument to the trials of the early pioneers. This is one of the most northern points of land controlled by the United States, and is located on Lake Superior, the great unsalted sea, and I believe a better and more proper slogan for the Dixie enterprise would be: "From the unsalted seas to the salted sea."

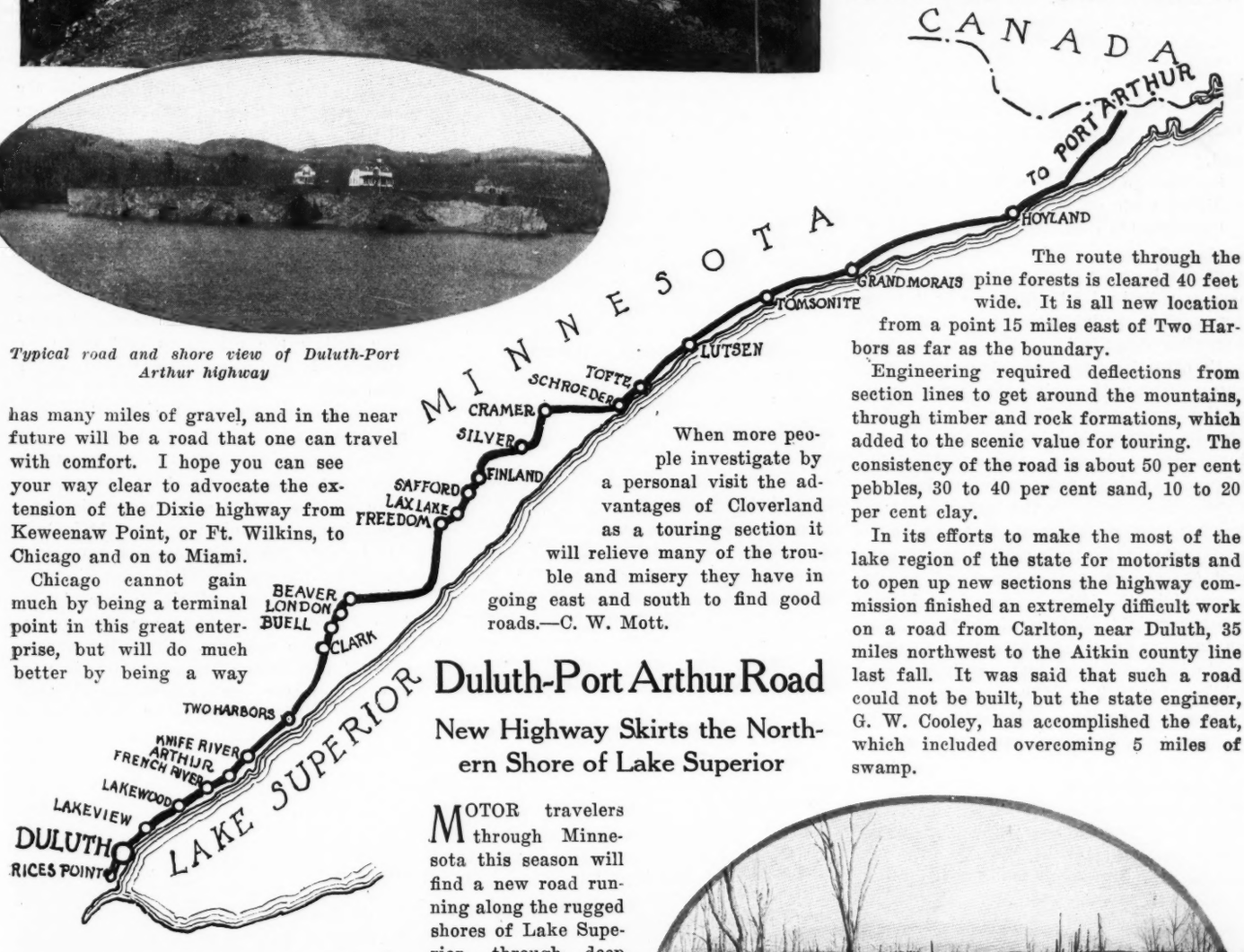
Chicago's commercial interests are of greater value to her from the territory north of Chicago for 300 miles than the territory south, for her efforts in the south are more or less crippled by the activities of St. Louis, Indianapolis, Louisville, Cincinnati, Memphis and other commercial points, while she actually predominates in the north for 300 miles with the exception of what commercialism Milwaukee, St. Paul and Minneapolis control.

From Ft. Wilkins to Menominee, a distance of 275 miles, is almost one continuous macadamized and gravel road, and the road between Menominee and Chicago

Typical road and shore view of Duluth-Port Arthur highway

has many miles of gravel, and in the near future will be a road that one can travel with comfort. I hope you can see your way clear to advocate the extension of the Dixie highway from Keweenaw Point, or Ft. Wilkins, to Chicago and on to Miami.

Chicago cannot gain much by being a terminal point in this great enterprise, but will do much better by being a way



station, which will enable it to be a factor in the upbuilding of its own commercial interests.

The hotels are convenient and comfortable, and near all of the cities there are inland lakes filled with pickerel, bass and other game fish. A great many miles of the excellent roads of Cloverland are through native forests and pass many points of scenic beauty. The golf clubs in the different cities of Cloverland extend the use of their links to visiting members of other golf clubs.

When more people investigate by a personal visit the advantages of Cloverland as a touring section it will relieve many of the trouble and misery they have in going east and south to find good roads.—C. W. Mott.

Duluth-Port Arthur Road

New Highway Skirts the Northern Shore of Lake Superior

MOTOR travelers through Minnesota this season will find a new road running along the rugged shores of Lake Superior, through deep forests and between rocky ranges of mountains 600 to 800 feet high. The road will lead from Duluth to Port Arthur, Canada. It is 170 miles to the boundary, where connection will be made with the splendid Canadian road continuing at least 60 miles farther.

The Minnesota state highway commission has supervised the road. The state will pay 80 per cent of the cost on the average and the counties the remainder, except that 2 years ago Lake County put out a bond issue of $60,000, whose proceeds largely are being distributed on the new road. The work cost $150,000, a sum which does not include the older portion between Duluth and Two Harbors a few miles north of Duluth.

It is no easy task to create the magnificent gravel top highway which Minnesota will complete next season. John H. Mullen, deputy engineer, returned recently from a motor tour over the road. He describes the highway as averaging 16 feet between ditches with gravel 8 feet wide.

The route through the pine forests is cleared 40 feet wide. It is all new location from a point 15 miles east of Two Harbors as far as the boundary.

Engineering required deflections from section lines to get around the mountains, through timber and rock formations, which added to the scenic value for touring. The consistency of the road is about 50 per cent pebbles, 30 to 40 per cent sand, 10 to 20 per cent clay.

In its efforts to make the most of the lake region of the state for motorists and to open up new sections the highway commission finished an extremely difficult work on a road from Carlton, near Duluth, 35 miles northwest to the Aitkin county line last fall. It was said that such a road could not be built, but the state engineer, G. W. Cooley, has accomplished the feat, which included overcoming 5 miles of swamp.

Through cut-over section on Duluth-Port Arthur road

What the Insurance Policy on Your Car Means to You

Liability Assumed by the Underwriters and the Rights of the Insured Are Explained

Some Comparisons Drawn Between Various Localities and Different Kinds of Policies

Editor's Note—On the following pages appears the first installment of a series of three articles on motor car insurance. This series, of which later installments will appear in succeeding issues, has been prepared specially for Motor Age by Robert Riegel, Instructor in Insurance, University of Pennsylvania.

By Robert Riegel

THERE are two distinct types of motor car insurance transacted in the United States, one by fire insurance companies, the other by casualty companies. The former write policies protecting the car owner against losses from fire, explosion, lightning, land and marine transportation perils and theft or robbery.

The casualty companies issue policies indemnifying for loss arrising from:

1—Legal liability of the insured to others for personal injuries sustained by them;

2—Claims made upon the insured for injury to or destruction of others' property and,

3—Damage to the cars of the insured by collision with other objects.

Considerable contention is caused by the fact that the car owner fails to realize that, as in other forms of insurance, the company limits its liability for such losses by various policy conditions which are hereafter described.

No other industry has evidenced such an enormous growth during the last 15 years as the manufacture of motor cars and parts thereof. From 1904 to 1909 the value of these products increased seven-fold. Value-of-product figures necessarily involve some duplication, owing to the inclusion of the value of separately manufactured bodies and parts in the value of complete cars, and the conservative estimate of persons engaged in the industry may be taken as a more reliable index. Even these show an increase in the 5 years subsequent to 1904 of about 500 per cent, as Fig. 1 shows, while from 1889 to 1909 the wage earners increased more than 3,300 per cent.

A concurrent development naturally has taken place in motor car insurance, which has evolved from the status of an insignificant side-line to an important branch of the insurance business. The period from 1908-1913 showed an increase in premiums collected for property damage insurance from $233,369 to $4,374,933, a growth of 1,700 per cent. See Fig 2. Whereas, in 1908 the sum paid by the companies for losses on this class of business was but $51,831, in 1913 they were compelled to expend $1,723,299 for this purpose. See Fig. 3.

Of the total of 111 companies and associations writing insurance in 1913 on motor car risks, forty-three were engaged in furnishing protection against loss of life and personal accidents, twenty-eight compensated the occupants of the insured car for injury, eighty-nine insured against loss from property damage and ninety-three against loss as a result of collision.*

Protection against collision usually is given by the indorsement of a clause upon the liability or property damage policy.

Classification of Vehicles Insured

For purposes of convenience and logical premium fixing, motor cars have been divided into the following four general classes:

1—*Private passenger vehicles;* including motorcyles and electric, gasoline and steam cars.

2—*Public motor cars;* including livery vehicles and taxicabs, omnibuses, sight-seeing cars and all cars for hire at stands. Livery vehicles include private passenger type cars rented or used for livery purposes, constantly or occasionally. The "jitney" is an example.

3—*Commercial vehicles;* comprising cars, motorcycles or cyclecars specially designed for the transportation of goods or merchandise.

4—*Manufacturers' and dealers' cars;* including cars at sales agencies, garages or stations.

The Insured—In insurance generally, the principle is established that for a contract to be valid and inforceable, the insured must possess an insurable interest at the time of the loss. This is such an interest that a contemplated peril may directly damage him financially. In liability insurance, the peril is a legal penalty for injuries to others; in property damage insurance, a legal penalty for injuries to others' property; in collision insurance, loss or damage of one's own property.

In liability insurance, the mere establishment of the legal responsibility creates the interest of the assured. The same is true of property damage insurance. In collision insurance, however, insurable interest might be more difficult to determine were it not that this protection usually is granted by an indorsement upon the liability or property damage form and thus the beneficiary is the same as under the latter policy. In the case of collision insurance separately granted, the courts would probably follow the principles laid down in cases involving insurance on property other than cars.

The Insurer—Of the liability business, by far the greatest portion is done by stock companies. Of thirty-nine more prominent insurers in 1913 twenty-six were United States stock companies and five foreign companies; while eight included London Lloyds', inter-insurers and American Lloyds' associations.

London Lloyds', of which our American Lloyds' associations are prototypes, deserve some mention. With the exception of the Boston Insurance Co. it was the first motor car underwriter in this country, and the liberality of its contracts at first caused their preference by many motorists. The Corporation of Lloyds, with a royal charter, provides for a meeting place, the collection of news, and rules of underwriting eligibility, including $25,000 deposit for transacting marine insurance and $25,000 additional for other lines.

The other corporation or association has no control over, or responsibility for, the underwriting of the various insurers, who are solely liable as

* Some companies write more than one line, hence the duplication in figures.

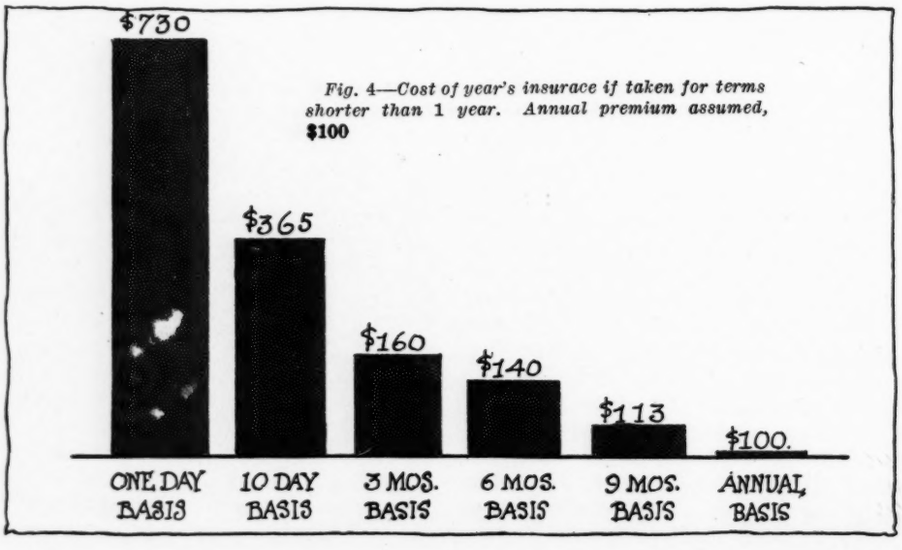


Fig. 4—Cost of year's insurance if taken for terms shorter than 1 year. Annual premium assumed, **$100**

individuals on those policies which they sign; but the standard of membership is strictly upheld. Each member voluntarily reinsures portions of his risks with other underwriters. Audits of accounts are made quarterly and each underwriter's reserve must be equal to 40 per cent of his outstanding business. A larger reserve is required than that kept by stock companies, since all premiums received—less losses and commissions—must be kept intact until the expiration of the policies.

American Lloyds' associations are similar in organization to the London association, but since the value of such insurers' polices depends upon the extent of liability and financial strength of the individual underwriters, the integrity of the American associations varies widely. Inter-insurers are practically mutual organizations, with the distinguishing feature that every insured is also an insurer to an extent proportionate to his own protection.

Term of the Contract

Motor car policies customarily are written for a term of not more than 1 year and insurance for less than 1 year is, as a rule, charged for on the basis of a short-rate table, of which the following is an abbreviated example:

Policy in Force	*Per cent. of Annual Prem.*
1 day	2
10 days	10
50 days	28
90 days or three months	40
120 days or four months	50
150 days or five months	60
180 days or six months	70
210 days or seven months	75
240 days or eight months	80
270 days or nine months	85
300 days or ten months	90
330 days or eleven months	95
360 days or twelve months	100

A diagram of this table, Fig. 4, shows that it is proportionately more expensive to insure for the shorter periods. The premium increases in lesser ratio the longer the term of the contract. This is not to be wondered at considering the fact that regardless of the term of the policy the expense of writing the business is approximately the same.

Fig. 4 shows the penalty attached to insuring for less than 1 year. Thus, if an owner were to insure himself daily, under policies of one day's duration, a year's insurance would cost him seven times the expense of one 1-year policy.

The exceptions to this rule are garage risks written for a term of less than 360 days, when such term coincides with the operation of the garage, and property damage insurance added to liability insurance during the term of the liability contract. Under these circumstances the policy may be issued on a pro rata basis, e.g., 6 months' insurance costs one-half of the annual premium. Collision insurance added during the term of a liability policy, however, is written at the short rates.

The insurance contract may be terminated in either of three ways, by expiry, cancellation by the company, or cancellation by the insured. The expiration of the contract occurs, of course, where the term elapses without renewal. It is provided in the policy, however, that either party may cancel the same, and that the company shall give the insured 5 days' notice of its intention to do so. If the company exercises this privilege it can collect only the pro rata premium for the time the contract has been in force. The insured, however, by canceling the policy incurs the penalty of paying for the time insured on the short-rate basis. Some companies provide that the premium collected shall be at least equal to a minimum prescribed in the policy, regardless of cancellation by either party.

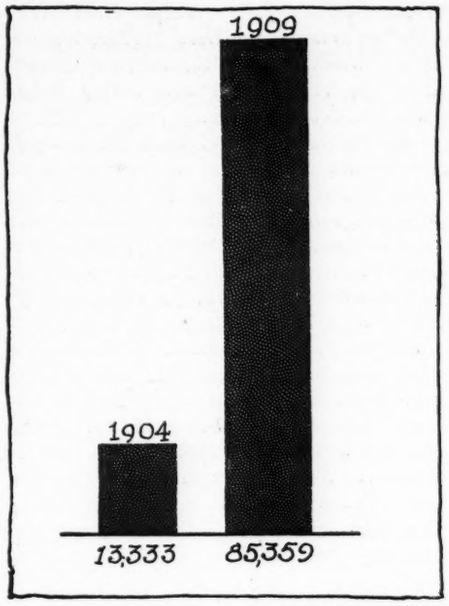


Fig. 1—Showing increase in cars from 1904 to 1909. During the period from 1889 to 1909 are wage earners increase was more than 3,300 per cent

Description of the Property

The car owner should note the provision of the policy that his statements are to be considered as warranties, thus removing from the insurer the burden of proving in a court of law that a statement is knowingly wrong and material to the contract. Some states by law, however, make all statements by the insured representations. Even then, these, together with the premium, are the consideration for the contract and if material to the same, such as the warranties regarding the model, price, non-transportation of explosives or passengers for hire, etc., their falsity or violation involves voidance of the policy.

The majority of the statements required pertain to the cars to be covered by the policy, and the description required includes the trade name, factory number of engine, kind of power, advertised and insurable horsepower, model, year of model, style of body and purposes for which used. Only the cars described are covered by the policy. Refusals of other companies to grant insurance to, or cancellations by former companies of the insurance of the applicant within the last 3 years must be stated. The property described, furthermore, is usually only covered by the policy while in use within the limits of the United States or Canada. Tourists whose policies contain such a clause should obtain an indorsement by the company covering travel in other countries.

Risks Insured Against

Liability—As stated, three types of protection are granted: First, against liability for personal injury; second, liability for property damage; and third, injury to the insured's property by collision.

Personal injury means that resulting from accidents caused by ownership, maintenance or use of the cars described, including death, whether instantaneous or not. The company also agrees to defend suits, even though groundless, brought on account of bodily injuries; to pay all costs taxed against the insured in legal proceedings; and to pay for imperative surgical relief at the time of the accident. Liability insurance, therefore, provides reimbursement for legal liability, service and expense.

Property Damage—Property damage insurance protects against injury or destruction of the property of others, except when in charge of the person assured or his employees, or when carried in cars covered by the policy. Such injury must, however, be the result of an accident and arise from the ownership, maintenance or use of the cars covered by the policy. Thus, goods may not be recklessly destroyed and any loss must be directly traceable to the insured motor cars. Loss by fire from any cause is not covered.

Collision—The collision clause — also called "damage sustained" indorsement—protects against loss or damage sustained by collision of the enumerated vehicles with a moving or stationary object. The measure of damage is the actual intrinsic value of the property at the time of the loss or the cost of repair or replacement. It should be noted that the original price is no measure of the liability of the company.

Two types of collision indorsements are in use, namely, the "Twenty-five Dollars Deductible Coverage" and "Full Coverage" clauses. The former makes the owner co-insurer with the company for $25 of loss, that is to say, exempts the insurer from liability for $25 of any loss. The latter, as its name implies, contains no limit upon the company's liability other than the intrinsic cash value of the property destroyed and the fact of the policy. The $25 deductible coverage clause naturally is an incentive toward carefulness and also relieves the company from many small, questionable claims.

In spite of the fact that the $25 deductible coverage clause may appear in juxtaposition with the appraisal clause, the courts have decided that the statement "The sum of $25 shall be deducted" applies to all claims and not only those where there has been a disagreement.

It is apparent that with the collision or "damage sustained" clause the liability companies have usurped the function of the property insurance company. Lia-

bility and property damage insurance are protection against third-party risks and consequently logical business for liability companies, but damage sustained involves no liability to any third party and is purely property insurance.

The company protects itself in many ways from excessive and unnecessary losses, thereby reducing the extent of coverage of the policy. Liability, property damage and collision insurance policies all have the following characteristics.

They apply only to the cars described in the policy, and only while the same are used within the limits of the United States and Canada. Furthermore, the policy being issued and the premium based on an estimated hazard, the insurer is protected against increase of the hazard by the insertion of clauses exempting him from liability where the car is used in a speed test, driven by a person under the age specified by law or under 16 in any event, or used for purposes other than those specified in the policy. It has been held that where the assured's son carried passengers for hire in a car specified as a private pleasure car, with assured's knowledge, there could be no recovery. Many cars are doubtless being used as "jitneys" now in ignorance of this provision.

The policy also is drawn so as to protect the insurer against the activity or negligence of the insured. The latter agrees that he will not voluntarily assume any liability, incur any expense other than for imperative surgical relief, settle any claim or interfere in any legal proceeding relative to the payment of a claim, and will relinquish the defence of claims to the company. Furthermore, he agrees that at the request of the company he will render all information in his possession and every aid in his power, other than pecuniary, in connection with legal proceedings. The company reserves the right to inspect any of the motor cars covered by the policy at all reasonable times.

It is required that actions at law for recovery under the policy be brought within 2 years of the payment by the insured of the loss or expense. In connection with reduction of loss might be mentioned also the various provisions applying after a loss, referred to hereafter, including the right of subrogation.

The following provisions restrictive of coverage are peculiar to the liability policy. The company is only liable for $5,000 for one person and $10,000 as a result of one accident. The policy does not cover, except by indorsement, any liability of the insured under compensation acts.

The property damage policy, irrespective of restrictive provisions and exceptions previously mentioned, provides that damage to the property of the insured is not covered, nor damage to the property of others while in charge of the insured or his employees or while carried in his car. The liability of a company is limited to the cash value of the property at the time of loss.

The collision policy excepts from coverage the following: Loss by fire, loss resulting from striking the roadbed or railroad ties, and loss by overturning unless as a result of collision.

Another important exception in the policy relates to tires. Loss or damage of these is not covered unless the total loss or damage in one collision including that to tires, shall exceed $200. Certain protective clauses also will be noted in the section dealing with the provisions applying after a loss.

Several suits have arisen in connection with collision insurance. In one case it was held that running into a hole in the street did not constitute a collision. A car ran off a highway bridge, fell into a stream and landed at the bottom upside down. It was held that the overturning was the result of collision and that the company was liable. Another car was steered out of the way of a team into grass beside the road. In returning to the road on an incline the machine overturned. This

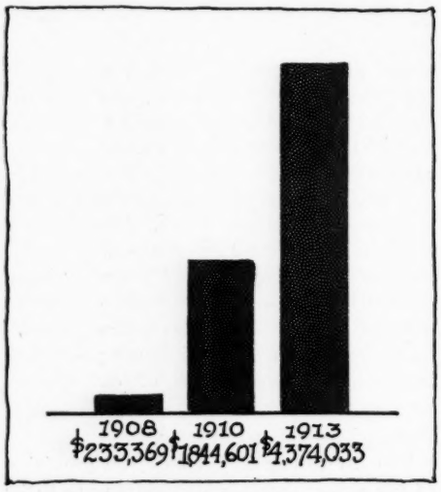


Fig. 2—The period from 1908 *to* 1913 *showed an increase in premiums collected for property damage insurance from* $233,369 *to* $4,374,033

was held to be a result of collision. In this case the grass was held to be not a part of the roadbed. Likewise, under particular circumstances a sunken gutter was held not to be a part of the roadbed.

Provisions After Loss

Notice of Loss—The features of the liability, property damage and collision policies which assume particular importance at and subsequent to the time of the loss may be discussed in one place, partly for brevity and partly because they are the same in essentials.

The insured, upon a loss, is required to give the company immediate notice of the same, with the fullest particulars obtainable. The word "immediate," while of very strong meaning in ordinary use, has been very reasonably construed as "prompt" by the courts where it appeared in other insurance contracts, and probably also would be construed so in a motor car policy. It is exceedingly dangerous, however, for the insured to place his own construction on the word, risk delay and depend on the courts to uphold him. The word "fullest," probably, also would have attached to it a similar liberal meaning. If the assured desires to make a claim for indemnity under the policy prompt notice of this also is required. These provisions enable the company to detect and prevent fraud and take measures to restrict its loss. The insurer has the right to examine the damaged property, and this probably at the place the loss occurred unless otherwise agreed by the parties.

In the settlement of a liability loss the insurer has only one resource, to pay the claim in cash. A property loss, however, by the terms of the policy, may be settled in one of three ways: First, the company may reimburse the insured for the amount of the loss in cash. Often, however, it is difficult for the two parties to agree upon the amount of the loss, and under some circumstances the second option of the insurer—to repair the property and restore it to its original condition—becomes valuable. The third option of the insurer is to replace the damaged property. Thus, if an insured insists upon claiming excessive damage it sometimes is advantageous to the company to take the damaged property itself and replace it with new.

Actual Value—The insurance company specifies in the contract that it is liable only for the actual value of the damaged or destroyed portion of the property at the time of the loss. It is a general principle of insurance that it is a contract of indemnity and that the insured shall not receive from the insurer more than he has lost. In spite of the apparent justice of this some policyholders labor under the impression that in case of total loss they should receive the face value of the policy. The companies writing insurance on motor cars against loss by theft, fire, lightning, etc., foolishly encourage this belief by writing a "valued" policy which so provides. In the interval between the issuance of a policy and its termination by a loss many causes operate to decrease the value of a car, changing fashions, new models, new methods of construction, ordinary wear and tear and use for special purposes, such as touring. The depreciation on a private passenger car, with the best of care, has been estimated at from 20 to 30 per cent the first year and from 10 to 20 per cent every succeeding year. Even if the company could estimate with any exactness at the issuance of the policy the probable depreciation on the car, this would mean that a thorough inspection of every risk would have to be made at the time of acceptance. Since losses occur possibly in about one-third of the instances where insurance is granted, in two-thirds of the cases this cost of inspection would be wasted.

Appraisal, to Settle—Should the insured and the company fail to agree on the extent of the property loss, it is provided in some policies that each shall select an appraiser and these two a third. The appraisers are to determine the extent of

liability of the company and their decision is usually upheld by the courts. In most states the insured is bound by an agreement to appraise, but in Pennsylvania, as one judge stated, "Such an agreement, like any other agreement of reference, is revocable, though the party may subject himself to an action of damages for the revocation."

Subrogation—Attention should be called to one very important right of the insurance company, which for safety is included in the policy contract, although its existence is well recognized in law. This is the right of subrogation. Subrogation may be defined as the acquisition by one person of another's rights arising from a third party's wrongful act or negligence; from a contract; or from other sources if the latter's rights will diminish the loss of the party first mentioned. In case of payment by an insurer to the insured, the former acquires or is subrogated to all the rights of the latter as described above. The motor car policy states that "In case of payment of loss under this policy, the company shall be subrogated to all rights of the assured against any person, partnership, corporation, or estate, as respects such loss, to the extent of such payment, and the assured shall execute all papers required and shall co-operate with the company to secure to it such rights."

Other Insurance

The policy contract contains the following provisions: "If the assured carry a policy of another insurer, against any loss or expense covered by this policy, the assured shall not recover from the company a larger proportion of the entire loss or expense than the amount hereby insured bears to the total amount of valid and collectible insurance applicable thereto." This provision is noteworthy in the following respects:

1—It prevents the insured from recovering more than the amount of his loss.
2—It differs from the wording of the New York Standard fire insurance policy which reads "to the whole insurance, whether valid or not, or by solvent or insolvent insurers."

An illustration will serve to bring out these points: Let us assume that the owner of a car is insured in Co. A for $1,000 and in Co. B for $2,000, at the time a loss of $450 occurs. Co. B is responsible for that proportion of the loss which its insurance, $2,000, bears to the total insurance of $3,000, or two-thirds of $450. Co. A is responsible for one-third of the loss ($450), or $150 as compared with Co. B.'s liability of $300. If Co. A proves to be totally insolvent at the time and unable to pay any part of the loss, then the total collectible insurance becomes $2,000, of which B has written 100 per cent, being therefore liable for the entire loss of $450. If the provision was the same as that of the standard fire policy Co. B would, in the latter event, be liable only for $400, its proportion of the whole insurance by solvent or insolvent companies, and the insured would suffer because of having insurance in a poor company.

It has been shown that during its comparatively short existence the business of furnishing indemnity for motor car accidents has expanded into an important branch of the insurance business. This has been possible only for two reasons, an increase in the number of cars and the fact that this form of insurance serves a real need. An increasing number of owners appreciate the advantages of transferring the risk of loss to an insurance company. The greatest aid to business, however, is a satisfied customer and the motor car insurance business would have had an even greater growth had policyholders more generally understood the contracts they were buying.

As in other forms of insurance, however, the injunction "Read your policy," has seldom been obeyed by the car owner, and he has often felt aggrieved without cause because the company refused to do something from which it had very plainly exempted itself in the contract. Only by a knowledge of the terms of the insurance

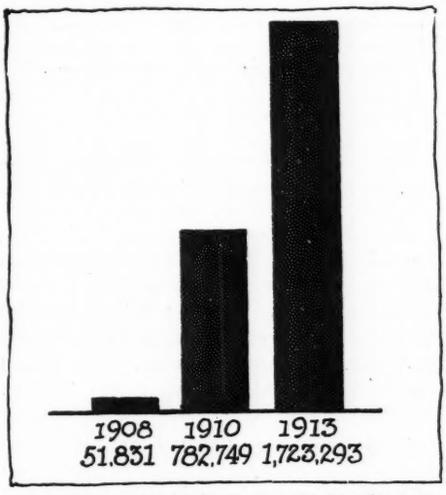


Fig. 3—In 1908 the sum paid by the companies for losses on property damage policies was only $51,831, whereas in 1913 they were compelled to expend $1,723,299 for that purpose

contract can a car owner intelligently purchase protection and appreciate its exact value, which depends upon the reliability of the insurer and the contingencies covered.

Readjustments in Rates

Liability, property damage and collision rates are fixed by the Workmen's Compensation Service Bureau of New York, a voluntary association composed of the leading companies engaged in the business. This work is in charge of a motor car committee since the bureau also is concerned with liability and compensation rates in general—hence the name. There are in New York state five companies operating which are not members of the Bureau, but even some of these adhere to the bureau rates. This organization is designed to furnish a means of collecting experience as a basis for rates and to promote uniformity in charges. The rates fixed apply to all parts of the country except states where co-operation in rate-making is prohibited by anti-compact laws.

Fire and theft rates are fixed by a similar organization called the Automobile Underwriters' Conference, composed of fire and marine companies writing this class of business.

Changes are made in the rates whenever the judgment of the committees having charge of this matter prompts a call for the experience of the companies. In the past rates have remained the same for as long as a couple years and for as short a period as several months. A call for experience has recently been issued in the case of liability rates.

Recent Tendencies

It is stated by underwriters that rates for fire and theft insurance have gone steadily down during the last 3 years on new models and even on old models of high-high-grade cars. With regard to old models and cheaper cars the same cannot be said. The rates on these have not been proportionately reduced and in some cases are higher than formerly. This is justified because of the heavier losses which occur on cars two seasons and more old, and in the case of cheaper cars those one season old are said to show the same high loss ratio as better makes do when two and three years old. The fire and theft rates have moved together, approximately, in the past, but owing to the abnormally large losses on Ford cars during recent years it is likely that special measures will have to be taken if companies are to continue to write the theft hazard on them.

A distinction is made in motor car liability rates on the basis of the location of the insured's residence, the country being covered by three schedules.

Schedule I applies to the five counties of Greater New York, Nassau county, Long Island and part of Westchester county.

Schedule II covers the city and county of St. Louis, Boston and nineteen adjacent cities and towns, Providence and the counties of Providence, Kent and Bristol.

Schedule III pertains to all other territory.

In addition, a differential schedule modifies the rates of certain sections covered by Schedule III. This differential schedule has been applied to the states of Arizona, California, Idaho, Mississippi, Montana, Nevada, New Mexico, North Carolina, North Dakota, Oregon, South Dakota, Washington and Wyoming and to sections of other states too numerous to mention.

Of the four schedules mentioned Schedule I is the highest in point of rates and the differential schedule the lowest. Recently the liability rates under Schedule I ranged from $32.50 to $103.50, Schedule II rates from $25 to $89 and Schedule III rates from $22.50 to $26.50.

As regards fire and theft insurance the country is divided for convenience into New England, New York, Western, Southeastern and Pacific coast departments. The states of Kansas, Iowa, Nebraska, Ohio, Illinois and Indiana are all within the Western department. The rates for all departments are practically the same, however.

The Readers' Clearing House

Preventing Spark Plug Fouling from Too Much Oil

Reader Suggests a Method He Has Found to Be Very Efficacious

INDEPENDENCE, Kan.—Editor Motor Age—In a recent issue of Motor Age one of the writers in the Reader's Clearing House asserted that a method had been discovered of especially preparing pistons in order to prevent fouling the plugs from too much oil. The writer left an air of profound secrecy surrounding his method in that he failed to describe leaving the impression that his knowledge was for sale. Contributors to this column in the past have recognized that its function was to serve the readers of Motor Age gratis and with this understanding this article is submitted. Advertising—as such—should be run in the paid columns. For convenience the drawing has been divided in quarters to be designated as 1, 2, 3, and 4, and shown in Fig. 1.

A very proper method of correction, 1-A, is the chamfered lower edge of the second ring groove, b, a $\frac{1}{32}$-inch hole drilled from the chamfered edge to the inside of the piston. This is for return flow of the access oil. An extra large hole in each side over the piston pin bearing and running into same will complete its lubrication and insure long life. The number of small holes around the chamfered edge should be determined by the extent of the fouling.

At 2 is shown the chamfered lower edge of the second ring groove and the small holes drilled through piston in the recessed space about the middle. Here, as in 1, the number of holes should be determined by the extent of the fouling.

At 3 is shown the chamfered lower edge of the bottom or oil ring. This very simple method is highly successful, a great deal easier to perform and is the one employed in the repair shops of the various Ford branches.

Fig. 4 shows the method employed in 1, as applied to the lower, or oil ring, is shown at 4. Ford pistons before the latter half of 1913 did not have this lower oil ring, therefore the ring wear and travel is limited to the space covered by the three top rings. Since this leaves a space a couple of inches high at the bottom of the cylinder which remains smaller than the top, it will be seen that oversize pistons that will fit the top will not go through the bottom of the cylinders and if it is desired to cut these in it will be found necessary to lap them in. Lapping

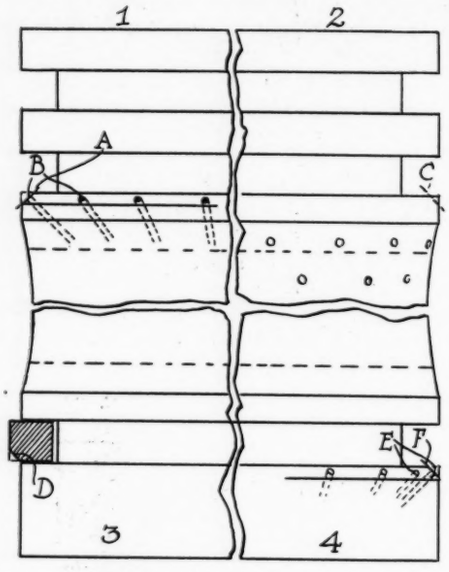


Fig. 1—How to remedy sparkplug fouling from use of too much oil

should be done with an old piston, the rings left in and pinned to keep them turning with the piston. Lapping is best done by power under a drill press with a dummy rod tapered to fit the press. The piston should be rotated and raised and lowered twenty-five to thirty times per minute.

Oversize pistons are not needed where any of the above methods for correction of fouling are used—their only function in such cases being to lessen the noise from piston slap. It is safe to say that a set of cylinders which offer objectionable noise from piston slap have been neglected in the matter of lubrication or are very old in service and in such cases the connecting rod bearings are always out-of-round in direct proportion to the wear of the cylinders and it will be found impossible to keep these rods tight and thus do away with the noise loose rods occasion.

In conclusion, will Motor Age please give the proper timing for a camshaft for exceptionally high speed for the average motor. This is for a Ford motor which it is desired to speed up to 2,700 r.p.m.—E. Reynolds.

Economy in Fuel Use

Groton, S. D.—Editor Motor Age—At what rate of speed will a car go the farthest on a gallon of gasoline, 10 or 20 miles per hour or faster?

2—In which car does it take the most power to drive, one with the transmission in a unit with the axle, or with it mounted midway?—M. R. Cook.

1—The majority of cars have their most economical motor speeds at a car speed of approximately 20 miles an hour. This varies somewhat, one make in particular

Plan for Remedying Evil Coming from Too Generous Use of Lubricant

finds the most economical speed at 15 miles per hour, while another is at close to 25. However, the average is very close to 20.

2—There will be no difference in the economy with any of the three locations of the gearset, except in so far as the number of universal joints is concerned. The fewer the universals the less the friction at this point, and the greater the economy, theoretically. Consequently a car with one universal, such as found more frequently in the unit plant, should be, theoretically, slightly more economical than those with more universals.

YOU SHOULD NOT IGNORE BATTERY

Harmful Voltage Is Built Up by Generator on Open Circuit

Alliance, O.—Editor Motor Age—I have a self-starting car equipped with generator and storage battery, but with magneto ignition. Will the generator be injured by running the car without the storage battery, which is at the repair shop, leaving the wires loose or disconnected at ends? If, as some say, this will burn the windings on the generator, what is the difference between this situation and one like the following: The battery is fully charged, but ammeter shows the generator is not charging the battery so the automatic cut-out has disconnected the generator from the battery? Why will this not injure the generator, same as the former situation? The latter condition often happens, so where is the difference, as the generator is running idle in both cases and not connected to the battery? I wish to run the car occasionally by hand cranking, as battery may be out of commission.

2—In a recent issue Motor Age said not to run a car without battery, so I wish a complete explanation of the difference in the two situations.—Harry Heiss.

1 and 2—It will damage the generator if you run the car without the storage battery connected. The difference between this condition and the one you cite where the storage battery is completely charged is that some form of regulation is always used which cuts down the output of the generator. As the battery becomes more and more charged, greater internal resistance is often set up which uses up the excess current generated with no harm to the generator. However, this is not the case when the battery is disconnected for the voltage generated builds up rapidly and very soon burns out the windings.

Some Causes of Skipping

Chillicothe, Mo.—Editor Motor Age—My car persists in skipping when throttled down. It is equipped with a Schebler model R carbureter and Remy ignition. To which of these shall I lay the blame?

2—Publish a diagram and explain the adjustment of the Schebler model R carbureter.—A. S. Tate.

1—From the very indefinite information you have given it would be next to impos-

sible to say whether either, or both, or neither the carbureter nor the ignition is to blame. If the mixture is too lean when the engine is throttled down this might have a tendency to cause intermittent action. Another possibility would be that the magneto was weak and did not always generate a sufficient size of spark at low speed. Usually when a motor skips this way the first point of attack is the carbureter adjustment.

ENGINE TEMPERATURE CONTROL

Cadillac Thermostat Operates on Principle of Expansion of Liquid

Albuquerque, N. M.—Editor Motor Age—Kindly advise whether or not there is in use a device used for keeping motor car engines at a certain temperature, on the principle of a thermostat. If so, what is the principle of it, and where is it attached to the engine?

2—Is there any that operates without the use of an electric current?

3—If more than one, kindly explain each.—E. C. Iden.

1—The only device of this character of which Motor Age has any record is the thermostatic control of the cooling water circulating system which is used by the Cadillac Motor Car Co. on its 8-cylinder engine. This works on the principle of the expansion and contraction of a liquid within a tube and does not operate electrically. The principle of the Cadillac device is shown in Fig. 2.

There is interposed in the water pump line for each set of cylinders a thermostat, which simply is a small coiled copper tube containing a liquid which expands or contracts in accordance with the temperature, thus slightly lengthening or contracting, its total movement being ¼ inch. This thermostat is in connection with a valve, so that when it expands, it raises the valve from its seat, this valve controlling the flow of the water to the radiator from the pump. A by-pass connects with the water-jacket of the carbureter, and when the engine is started, the water naturally is cold. Therefore the thermostat is contracted and its valve is on its seat. Thus the radiator water is shut off, the circulation being simply through the water-jackets of the cylinders, through the by-pass to the carbureter jacket and thence back to the cylinders.

In this way there only is a small part of the water circulating, and when this heats up, the thermostat begins to expand and lift its valve from its seat, letting the radiator supply flow into the system. This action continues back and forth, so that the water temperature is nearly constant. This naturally has a beneficial effect on the carburetion.

2 and 3—We do not know of any device of this character which operates on electrical current.

FIRST CYLINDER OF FORD IS BAD

Suggested Causes of Overheating in Overland—Puzzling Case

Rector, Ark.—Editor Motor Age—I am having trouble with my Ford car. Cylinder No. 1 gives quite a bit of trouble, and has given ever since new. I have ground valves, exchanged plugs, changed coils and about an hour of service is all I can get out of this cylinder at one time. I have the regular Ford electric equipment on it. This cylinder has good compression and when plug is shorted at top shows good spark, have tried different plugs.

2—We have some Overland cars here that are new, or practically so, but when the engine gets warmed up they have a knock in them. Sounds like a car trying to pull a heavy grade on high gear. Have taken these cars down and fit bearings, but that does no good. They run as smooth as any car until warmed up. The factory man was here but did them no good. Can Motor Age give me some idea—Gene Carter.

1—The trouble is that oil gets to the front end of the motor too plentifully and is splashed up into this cylinder in greater amount than it should be. You must not put too much oil into the reservoir. Be sure that at no time the oil level is above the upper try cock at the flywheel housing. Some kind of leak-proof rings would also be of benefit.

2—Possibly the ignition is not timed correctly. It sounds as if it is retarded too far in reltaion to the engine speed. Possibly there is something the matter with the oiling system, or the carbureter may be out of adjustment. There might even be some restriction in the cooling system, preventing the proper circulation of the water.

HE WANTS TO GET INTO RACING

Young Speed Bug Anxious to Learn, But Would Have to Start at Bottom

Westfield, N. Y.—Editor Motor Age—What are the speed advantages proven in the Knight motor?

2—Why were Finley R. Porter's race cars not successful in speed contests? Was the iubrication at fault?

3—Were the Mercer race cars of the valve-in-the-head type built early in the spring of 1915?

4—Are they trying to make speed machines of them?

5—What would be the chances of a young man, eager to learn, to secure work constructing new Premier race cars? Would the requirement be an expert mechanic, or would he be allowed to start in at low wages and work up?—Robert Cochrane.

1—Due to the construction of the Knight engine, the valves are positive in their opening and closing at any engine speed, which is an advantage. Another point is that the opening is large, allowing a maximum amount of fuel to get into the cylinders in a short period of time. Also this large and positive opening has an advantage in scavenging of the cylinders after the working stroke.

2—Mr. Porter's cars were not ready in time for the races of last year.

3 and 4—Motor Age does not know exactly on these points. Perhaps the Mercer company can enlighten you.

5—Probably the best way is to start in as a helper and work up as greater experience is gained. The factories always have room for ambitious, alert persons, and their ability is soon recognized.

Inquiries Answered and Communications Received

E. Reynolds	Independence, Kans.
M. R. Cook	Groton, S. D.
Harry Heiss	Alliance, O.
A. S. Tate	Chillicothe, Ma.
E. C. Iden	Albuquerque, N. M.
J. M. A.	Detroit, Mich.
Gene Carter	Rector, Ark.
Robert Cochrane	Westfield, N. Y.
Albert R. Hawley	New Paris, O.
J. J. Mehaffey	Lindale, Ga.
H. E. Larson	Chicago
W. O. Cosby	Walsenberg, Colo.
A Reader	Huntingburg, Ind.
A Subscriber	Greenview, Ill.
A. E. G.	Washington, D. C.
Clarence Clevenger	Santa Clara, Cal.
E. L. Kerfoot	Hutchinson, Kans.
C. E. Wool	Poison, Mont.
Joseph D. Hauck	Chicago
C. R. Lundell	Kiron, Ia.
A Reader	El Paso, Tex.
George I. Jones	El Dara, Ill.
John Mezey	New York
R. J. Strauch	St. Peter, Minn.

No communications not signed with the inquirer's full name and address will be answered in this department.

SPARK MAY BE ADVANCED TOO FAR

Brief Discussion of the Knight Motor—Opening and Closing of Valves Positive

New Paris, O.—Editor Motor Age—I have a Ford that has a peculiar knock, something like a slapping knock. It knocks only when the spark is advanced. When the spark is retarded it stops. Advance the spark and it will knock running idle, fast, slow, pulling or coasting. Bearings are all tight and has new piston rings. I turned the timing gear back one cog, but this did not help it. The car has power, but does not get out like there is any life to it. Motor Age explained the Hotchkiss drive in the February 3 issue, but I do not see how it could drive through the rear springs. Please explain.

I have been reading a good deal on the sliding sleeve valve Knight motor. All I have seen about it were its good qualities. I would like Motor Age to give me some of the bad points of it, if there are any.—Albert R. Hawley.

1—The trouble you mention is probably due to the spark being too far advanced in its adjustment. In the first place put the timing gears back the way they were before you tampered with them, and then lengthen the rod a little which runs from the bottom of the steering gear to the ignition timer or commutator at the front of the engine. This will serve to retard the spark. Do not lengthen the rod over ¼-inch, say, and then try the adjustment before making it permanent.

There have been so many discussions of the Knight engine in these columns that it would scarcely be fitting here to go into a lengthy dissertation on the type of motor. Suffice it to say that the Knight engine of today is a highly developed product and the concerns using it have practically eliminated all of the things that mitigated against it in the earlier days of its development. Possibly it could be criticised for its greater number of parts, more bearing surfaces and additional weight as compared with the poppet. On the other hand, the opening and closing of the valves is absolutely positive, the area of the port openings is greater than the poppet of average design, and the engine is silent, although this latter point ceases to be a serious one since all engines these days are exceedingly noiseless.

Dodge Test Hill

Detroit, Mich.—Editor Motor Age—In March issue of Popular Science magazine on page 393 is a description and illustration of Steel Test Hill for automobiles put up by a Detroit auto factory. Can Motor Age tell what concern this article has reference to?—J. M. A.

Undoubtedly the steel test hill to which you refer is that used by Dodge Bros. for trying out their new cars. By the way, this was described and illustrated in Motor Age of Sept. 23, 1915, on page 8.

Cylinder Out of Round

Lindale, Ga.—Editor Motor Age—Kindly advise what is the cause of a knock on a Lozier model 84. The bearings are tight. The cylinders are 3/64 inch larger one way than the pistons and 1/32 the other. Would this cause the knock, and if so, kindly advise how to bore and finish them. The cylinders are 4¼-inch in diameter.—J. J. Mehaffey.

1—This is probably due either to loose rings or to the fact that the cylinders are

out of round. In fact, it would be strange if there were no noise when the cylinders are in this condition. They should be put on a lathe and reground, but you are advised not to attempt such a process. Take the car to a good garage mechanic who has the equipment and knows how to do such work through experience.

WANTS TO ALTER CAM CONTOUR

Not Advisable to Cut Down the Valve Opening as Reduces Power

Pittsville, Wis.—Editor Motor Age—I am overhauling a four-cylinder motor with overhead valves which is very noisy and would like to know if by reducing the valve lift to $\frac{3}{16}$ or $\frac{1}{4}$ of an inch would make any difference in the noise, the present lift being $\frac{1}{2}$ inch. The cams are also very sharp like this 0, which I think would cause a great deal of noise, but possibly may be remedied by grinding of the points to make it more round. Also let me know if this would affect the power of the motor, and in what way.

2—What is the average valve lift of the present motors?—C. I. Ludewig.

1—You might decrease the noise by doing this, but you would also cut down the power because the valves would be opened less. This would cut down the charge admitted and lessen the possibilities of properly ridding the cylinders of burned gases.

2—Somewhere in the neighborhood of $\frac{1}{2}$ inch.

MOTOR NOT DESIGNED THAT WAY

Cannot Leave Water Pump Off Engine Not Intended for Thermo Cooling

Huntingburg, Ind.—Editor Motor Age—I am overhauling a Flanders motor on which the water pump is broken. Is it absolutely necessary to have a water circulating pump on this motor? Would it not do to tap a hole on the No. 4 cylinder next to the dash in the waterjacket and allow the cold water to go in one end and out at the other end into the radiator?

2—What is the idea of tapping the water in the jacket between the second and third cylinders? Would it not be better to tap on the end as stated above?

3—In the Ford motor when the cylinder head is taken off there are several $\frac{1}{8}$-inch holes leading from the cylinder jacket into the cylinder head. What is the idea of this?

4—Why is it that the air-friction carbureters are not more advertised and used on stock cars, as the A. F. Co. puts such a strong guarantee behind their carbureter?

5—Why is it that gasolette is not used more extensively? Will it pay to use gasolette? What effect has it on the motor?

6—Would it be better for starting the Flanders 20 motor to shorten the intake manifold and use a cowl gasoline tank? Would it improve the pulling any?—A Reader.

1—Yes, you must have a pump. This motor was not designed for thermo-syphon. The scheme you mention would not work satisfactorily.

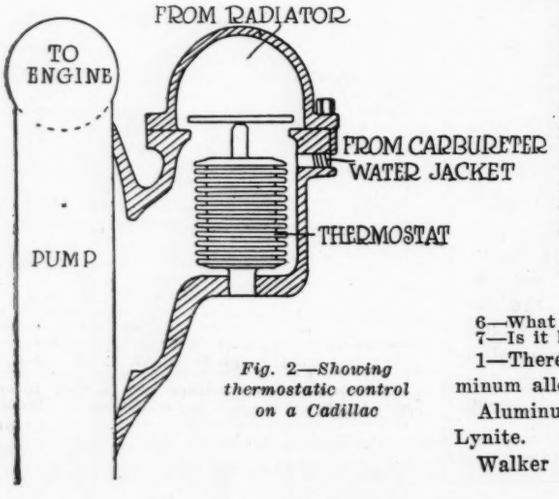


Fig. 2—Showing thermostatic control on a Cadillac

2—This gives equal distribution both ways from the point of entry. If you put it in at the end cylinder, it has to go through all the others to get to the front.

3—There have to be passages from the cylinder casting into the head for the cooling water. You either refer to these or the holes in which the head bolts seat, and we are not sure which you had in mind.

4—We do not know.

5—What is gasolette?

6—Probably beneficial results as far as motor operation is concerned would come from raising the carbureter and shortening the intake, as you would give last chance for condensation of the fuel. But it is doubtful if the results obtained would warrant the expense and trouble.

ASKING GREAT DEAL OF MAGNETO

May Start on One-Quarter Turn of Crank if in Good Order

Greenview, Ill.—Editor Motor Age—Will the flywheel magneto on a 1912 Ford be strong enough to operate electric headlights where the ignition is furnished by a Bosch magneto N U 4 model?

2—Which would be better, 12 or 15 candlepower bulbs?

3—Is there any difference in size in the bases of a 12 and 15 candlepower bulb?

4—Should a Bosch N U 4 magneto furnish enough spark with a quarter turn of the engine to start it?

5—Which is better for a Ford car, a light or medium cylinder oil?—A Subscriber.

1—Yes, it should be.

2—Probably 12 candlepower bulbs would be best.

3—The bases are standard and the same size for both bulks.

4—You are asking a great deal of the magneto to expect it to start the motor on one-quarter turn of the crank. However, if everything is in good order and there is a charge in the cylinder that is readily ignitable, undoubtedly the magneto would be able to start the car on one-quarter turn.

5—Medium cylinder oil is best for the engine.

SEEKS MAKERS OF MAGNALIUM

Wants Formula, Physical Properties, Comparison of Strength, Etc.

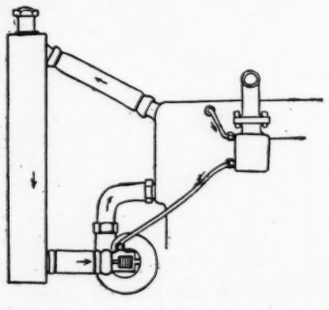
Chicago—Editor Motor Age—What foundries in the United States make magnalium?

2—What is its formula?

3—What are its physical properties?

4—How does it compare with aluminum in strength, etc.?

5—How does it compare with bronze in strength, etc.?



6—What acids, if any, affect it?

7—Is it hard to machine?—H. E. Larson.

1—There are four foundries making aluminum alloy castings These are:

Aluminum Castings Co., Cleveland, O.—Lynite.

Walker M. Levett Co., Nineteenth avenue and Thirty-sixth street, New York—Magnalium.

A. B. C. Foundry Co., Cleveland, O.—A. B. C. Alloy.

Garford Mfg. Co., Elyria, O.—Arrowlyte.

2—The exact formulas vary considerably, and also they are considered trade secrets.

3—The hardening element in all of them is magnalium, but it varies with different alloys as to quantity, from a bare trade to possibly 5 or 6 per cent.

4—As to its strength compared with aluminum, the magnalium aluminum alloys are possibly 25 per cent greater in strength if produced under technical control of the casting. The Lynite, for instance, is made in permanent moulds with a secret process. The others are sand castings.

5—None of the alloys, except aluminum bronze are as strong as pure bronze.

6—Alkalies are as bad as acids, so far as their effect on aluminum alloys are concerned. Ammonia is as bad as any of them. No alloying element has been discovered as yet to prevent the action of acids or ammonia.

7—It is very easy to machine.

PROPER WAY TO USE SPOT LIGHT

Incurs No Changes in the Electric System Using Non-Leak Rings

Washington, D. C.—Editor Motor Age—Will tightening the clutch springs on a Hupp 32 prevent the clutch from slipping?

2—My car carbonizes quickly and smokes considerably. Does Motor Age think a leak proof ring at top of each piston will do much good?

3—Would graphite in the cylinder oil, which also oils the clutch, have a tendency to make the clutch slip?

4—Would it necessitate any changes in electrical system to install a Spot light?—A. E. G.

1—Yes, if there is any way of doing it.

2—Very likely this would help, but even better results should be obtained by using a full set of rings.

3—There is no reason why it should.

4—No. Connect it in parallel with the dash light.

Effect of Oversize Tires

Walsenberg, Colo.—Editor Motor Age—I have 33 by 4 tires on my rear wheels and 32 by 3½ on the front wheels. Does it take away any power when you have oversized tires on rear? Please explain if it does, and how much. —W. O. Cosby.

1—The difference would be so slight as to be almost negligible. The only thing the oversize tires do is to raise the ratio slightly between speed of engine and wheels. That is, it would take slightly less number of revolutions of the crankshaft to travel a given distance where you use tires of larger diameter.

Putting Pep in Flanders

Santa Clara, Cal.—Editor Motor Age—I have a Flanders 20 of the vintage of 1910, which I have stripped and cut down to make a speed boat. I desire to install a more efficient carbureter and a high-tension magneto. The machine is equipped with a Flanders carbureter and a Splitdorf model F magneto. Advise what make of carbureter and magneto are best to use and what changes are best to use.

2—What other changes or improvements are necessary for speed and general running order? —Clarence Clevenger.

1—Any of the well-known makes of carbureter and magneto should prove highly satisfactory.

2—You might put in aluminum pistons

and some kind of non-leak piston rings. Also thoroughly overhaul the engine, advance the spark timing and set the camshaft ahead slightly. This can all be determined best by trial, as each engine has its own individuality and must be "babied," so to speak.

MOTOR APPEARS TO HAVE LEAK

Water May Come Into Combustion Chamber Through Sand Hole

Hutchinson, Kans.—Editor Motor Age—A peculiar condition has arisen after overhauling a Hudson 20 motor. Drops of water can be seen clinging to the inside of the discharge pipe of the muffler and when the motor is running little drops of water are occasionally expelled from the muffler. More water accumulates in the muffler as fast as it is expelled by the exhaust gases. This condition continues as long as the motor is running. Getting it warmed up has no effect on the water continuing to appear.

The motor has just recently been overhauled and cleaned out thoroughly inside. Fresh oil was put in and there has been no chance for water to become mixed with the lubricating oil. It does not seem possible that there is a leak from the waterjacket to one or more of the cylinders since the motor fires perfectly at all speeds. Since the cylinders and valve ports were bored out during the overhauling operation a leak of this kind might have easily occurred by uncovering or cutting into a small sand hole leading to the waterjacket, but the fact that the motor fires so perfectly seems to eliminate this possibility. There are no water pipes near exhaust manifold or exhaust pipe. So far as I can determine the above condition has absolutely no effect on the operation of the motor nor does it do any harm in any other way, but I am curious to know the cause. Can Motor Age help solve the mystery?—E. L. Kerfoot.

The only cause to which we can ascribe this phenomenon is the formation of water as a product of combustion. It might be, however, that in boring out the valve ports you sprung a very small leak in the wall due to a thin spot or sand hole, but from what you say this seems to be a remote possibility.

WANTS TO RE-DESIGN A LAMBERT

Desires to Convert Friction Drive into Gear Type But Would Be Big Job

El Dara, Ill.—Editor Motor Age—There is a crack across the center of the driving disk on the friction drive of my Lambert car. What is the cause of this?

2—There is a sheet of paper between this aluminum disk and the wheel that carries it. Could this be removed, and what would be the result?

3—Would it be practical to change this car to a gear drive? The engine is all right.

4—The motor is a 30-horsepower Continental with a bore and stroke of 3¾ by 5 inches. Would this give good service if made into a tractor?—George L. Jones.

1—The exact cause would be hard to find, but possibly it was due to putting too heavy a load on the drive system, such as pulling out of a deep rut, etc.

2—No, this should not be removed.

3—It could be done, but you would have to use a different axle and entirely revise the entire power transmission system.

4—The change probably could be made and if the speed of the motor is not too high the results should be satisfactory.

ENLARGING VALVES ON A FORD

Probably Would Increase Speed and Power Slightly, but Would Use More Fuel

El Paso, Tex.—Editor Motor Age—Will enlarging the valves on a Ford motor increase speed and power without cost of gas?

2—Will the 1912 Ford camshaft give more power than the faster one of later years?

3—Does Motor Age know of any other valve larger in diameter that will fit in the stock?

4—Does Motor Age consider a Ford roadster equipped with light pistons and connecting rods, Bosch magneto, wire wheels, body light, and set back 8 inches to balance the car, rigged?

5—Could a 3 to 1 gear ratio be used with two people under any road conditions instead of stock gears?

6—Will pistons with rings all on top or two on top and one on the bottom give the best results?

7—Also the late pistons are campered around the top edge, while the older ones were square.

8—Which gives the best compression and explosion action?—A Reader.

1—This probably will increase the speed of power slightly, but will use more fuel, for the increased speed of power.

2—No.

3—No.

4—Yes, under any ordinary road conditions. It will not be so good for hill climbing or work on heavy roads.

5—There is little difference.

6 and 7—The later campered valves operating a change valve to each piston usually give better compression after long use. There is a difference when the car is new.

TIMING THE VALVES FOR SPEED

Cannot Arbitrarily State the Required Flywheel Weight—Must Know Engine

New York—Editor Motor Age—I am building a high-speed engine 4 by 6, what is the best timing for the valves?

2—What size flywheel should I use?

3—What was the valve timing on the Stutz that won the Astor cup and the valve timing on the Peugeot racer?—John Mezey.

1—Open the exhaust about 45 degrees before bottom center and close at about 10 degrees after top center. Open the inlet a little past top center and close it at about 50 degrees past bottom center. This is merely a suggestion and might not work out so well as some other timing. It would be impossible to state arbitrarily what timing would be best without knowing the engine and experimenting with it.

2—That would depend on whether it were a four or six and on other considerations. You cannot arbitrarily fix the weight of the flywheel by knowing the bore and stroke.

3—Motor Age cannot publish this information.

GEARS MUST HAVE SAME PITCH

Cannot Mesh Two Speedometer Gears of Different Pitches

Walnut, Ill.—Editor Motor Age—I have a Ford motor which has been built into a racing car. I can obtain 50 miles per hour on the level, but on downgrade or downhill the car will not go any faster. In fact, it seems it does not scavenge itself. I am sure it can be made to turn over much faster. I have oversize pistons and leakproof rings, but the valves and camshaft are regular stock equipment. Would I gain anything by setting the camshaft ahead or back, and how many teeth?

2—I have two speedometer fiber gears. Both of them have 16 teeth, one has a circumference of 6⅜-inch and the other one is 7⅛. On a large gear of 49 teeth, say, the ratio of each would be 3 to 1. Would there be any difference in the mileage readings of either gear, conditions alike, and how much?—F. E. G.

1—Yes. One can only tell by trial.

2—Obviously the two pinions which you have are of different pitches. If it were possible to run either of these with the 48-toothed sprocket you mention, the ratio would be the same in either case, 3 to 1, but it would undoubtedly be impossible to run either pinion with this sprocket. That is, it is very likely that the pinion of 6⅜-inch diameter is an 8 pitch, and that the 7⅛-inch pinion is a 9 pitch. The gear with 48 teeth may be a 10 pitch, so neither pinion would work with it. In other words, the pinion must mesh properly with the large sprocket in order to operate.

STORAGE BATTERY IS ESSENTIAL

Reasons Why It Is Necessary in the Car's Electric System

Polson, Mont.—Editor Motor Age—I have a car equipped with a Delco starter which appears to be in good order. Have had the generator overhauled and pronounced in good condition but have been unable to get a battery that will stand up; that is, hold the charge. It is not in the wiring, which is all in good shape. Kindly advise me of some device to use whereby I can use the generator without using a battery and run no risk of burning out the generator or lamps. The Delco people say it cannot be done.—C. E. Wood.

1—There is no possible way that you could use the generator without a storage battery in the system. There must be some unit in which the excess electric energy produced by the generator can be stored when it is not needed by the lighting and ignition and also there must be a reserve supply of electrical energy to be given out when the output of the generator is not great enough to meet the demand. Hence the storage battery is absolutely essential to perform these two and other functions.

Your trouble is undoubtedly due to improper care of the storage battery and you are advised to read the series of articles on Storage Battery Care which have been running in the Repair Shop department of Motor Age.

CANNOT RUN WITHOUT BATTERY

Would Harm Generator to Run It with Accumulator Disconnected

St. Peter, Minn.—Editor Motor Age—Will generator be harmed by driving a Hupmobile 32 with the storage battery disconnected? A Reo? Both cars have two-unit electrical equipment with magneto ignition.

2—Does Motor Age know where wire wheels for this Hupmobile can be purchased? Cannot find such wheels to fit the rear axle shafts.

3—What speed will a Hupp 20 thoroughly stripped of unnecessary equipment develop? Also Hupp 32?

4—Where and by whom is the Nelson-Le Moon car made? What are motor dimensions and horsepower? (Miss F. will answer)—R. J. Strauch.

1—It will harm the generator of any electric lighting and starting system to run with the storage battery disconnected. It is apt to burn out the internal windings of the electric unit.

2—Write the Houk Mfg. Co., Buffalo, N. Y.

3—This is difficult to state, but probably the Hupp 20 will attain a speed of about 45 miles per hour. The Hupp 32 should be good for 50 to 55 miles per hour.

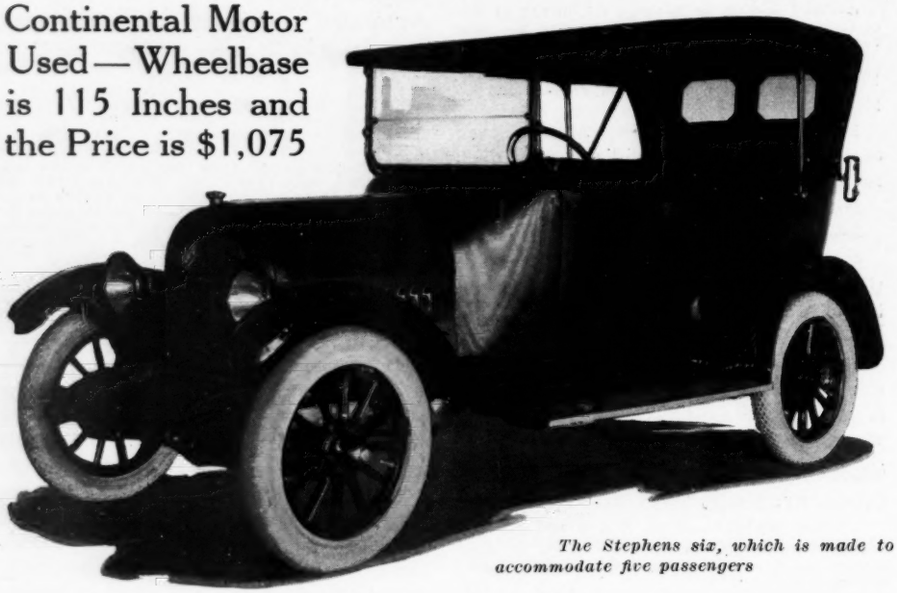
Magnets Must Not Be Overcharged

Chicago—Editor Motor Age—In Motor Age February 13, 1913, Repair Shop department, in regard to recharging magnets, Motor Age states that a piece of metal cannot be charged too much, for it will hold only a certain amount of magnetism and no matter how long the operation continues after the saturation point has been reached the metal will hold no more. In Motor Age dated February 10, 1916, you state care must be taken not to oversaturate the magnets, for if they are overcharged they are useless. There seems to be a contradiction in these two items. Kindly publish which is correct, or is it a case of it making no difference, just so you go through the motion? The Motor Car Repair Shop page in Motor Age is the first page I look for every week. It is very interesting and teaching to me.—Joseph D. Hauck.

1—The statement made 2 years ago on this point is incorrect. Follow the directions given in the recent article.

Stephens Six Product of Moline Plow Co.

Continental Motor Used—Wheelbase is 115 Inches and the Price is $1,075



The Stephens six, which is made to accommodate five passengers

THE Stephens six at $1,075 is among the latest of the 1916 cars to make its bow to the public. It is the product of the Stephens Motor Branch of the Moline Plow Co., Freeport, Ill. The motor is a Continental with a 3¼ inch bore and 4½ inch stroke and is said to give a brake test of 40 horsepower. The cylinders are block cast and the power plant is in unit with the gearset, the latter being of the selective type with three speeds forward and one reverse. Control is midship, the clutch being a multiple dry disk.

The carbureter is a Zenith with both hot-air and hot-water attachments, and cooling is accomplished by circulating pump in connection with honeycomb type of radiator. The Connecticut automatic ignition system is found in the new Stephens and the starting and lighting is Auto-Lite with Bendix drive and a Willard storage battery. Lubrication is force feed.

Big Braking Surface

Both the internal expanding and the external contracting brakes are used, the braking surface being 250 square inches. The Hotchkiss drive with double universals is employed, the rear axle being of the floating type with pressed steel housing and spiral bevel gears. Semi-elliptic springs are found in the new Stephens in both the front and rear. The wheelbase is 115 inches and the tread 56 inches. Goodyear 32 by 4 straight-side tires are fitted in front and the same size in the rear except that the latter are the all weather tread. The 19-gallon gasoline tank is hung in the rear from which fuel is fed to the carbureter through the Stewart vacuum gravity feed.

The body accommodates five passengers, follows the stream line in design and is upholstered in leather. Equipment is very complete, the one-man type of top with easily removed or detached side curtains, ventilating rain-vision windshield, motor driven horn, Stewart-Warner speedometer and tire pump, the latter engine driven, tire carrier and tools go to make up the equipment.

TIRES HALF OF RUBBER PRODUCTS

Washington, D. C., March 18—The condition of the rubber industry from the standpoint of manufacturers, as disclosed by the 1914 census, is treated in a statement issued by the bureau of the census, and it shows an enormous growth in the manufacture of tires.

Reports were received from 331 establishments. The principal products of twenty-three of these establishments were rubber boots and shoes; of 18, rubber belting, hose, packing, etc.; and of 290, motor car tires or casings and inner tubes, motor cycle and bicycle tires, rubber clothing, druggists' and stationers' sundries, and other miscellaneous rubber goods. The products reported for the 331 establishments for 1914 were valued at $300,251,827. At the census of 1909, 267 establishments were reported, with products valued at $197,394,638. The increase in value of products, therefore, was $102,857,189, or 52.1 per cent.

The production of rubber tires for 1914 was valued at $146,411,692 and formed 48.8 per cent of the total value of all kinds of rubber goods manufactured during the year. Statistics for the manufacture of tires were not obtained for 1909, but it may be safely assumed that the increase of 52.1 per cent in the total annual output of rubber goods during the 5-year period is accounted for in large part by the enormous growth of this branch of the industry. There was reported the manufacture of 8,020,815 motor car tires or casings, valued at $105,671,223; 7,906,993 motor car inner tubes, valued at $20,098,936; solid tires for motor and other vehicles, to the value of $13,735,681; and of 3,728,138 motorcycle, bicycle, and aeroplane tires, valued at $6,905,852.

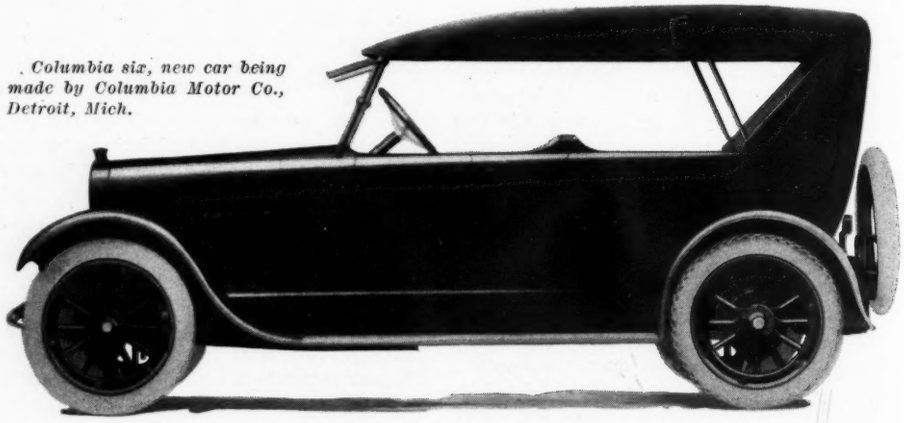
Columbia Six Will Be Ready in June

Detroit Concern Announces Features of New Car

SO far have the plans of the Columbia Motor Co., recently organized in Detroit, by some prominent men in the industry among whom are W. E. Metzger and J. G. Bayerline, been completed that a preliminary idea of the type of car that is to be manufactured is now given out. Built on a wheelbase of 115 inches, the new Columbia is a six that should claim a position for itself due to its very pleasing outline and general good looks. The ultra-modern type of body design is used in continuing the hood on exactly the same slope as the rest of the body, using a cowl at the back of the front seat, rounding the front of the body over, and slanting the windshield.

The car will be constructed of standard units with the motor a 3 by 4¾ block-cast six having a multiple dry-disk and three-speed gearset in unit with it. There will be a two-unit starting and lighting system,

Columbia six, new car being made by Columbia Motor Co., Detroit, Mich.



the name of which is not yet divulged. Other specifications include Timken front and three-quarter floating rear axles, cantilever rear springs and semi-elliptic front suspension, chrome-nickel steel frame, and Stewart vacuum feed from a tank at the rear. Some of the equipment features are 32 by 3½ tires on demountable rims, crowned fenders and other features that go with the up-to-date vehicle.

Roominess of the body is made one of the features as well as the general body appearance. The back seat measures 46 inches across, outside of the upholstery.

While only the first car has been built to date, orders for the parts for the first allotment of 2,500 cars are now being placed, it is claimed. Deliveries are assured about the middle of June, according to present plans. Although the price has not been definitely set, it is stated by the Columbia officials that it will be somewhere in the region of $900.

WANT UNIFORM SERVICE PLAN

Detroit, March 18—Not only are the members of the Automobile Service Managers Association of Michigan in favor of the adoption by the manufacturers of a uniform or standard service plan, but local distributors and dealers approve the idea and are hoping that an understanding will soon be reached for the adoption of such a plan.

At the meeting held at the Hotel Statler, March 16, a plan was outlined and approved by those present from the service managers association. The matter has been taken up with general manager Alfred Reeves of the National Automobile Chamber of Commerce, to be taken up by him with the members of the chamber.

KEEP-YOUR-CAR-NEW CAMPAIGN

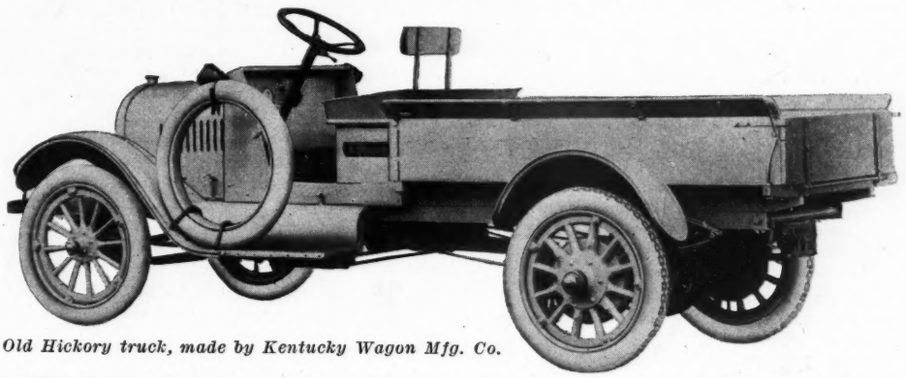
Detroit, Mich., March 18—A campaign in which all motor car manufacturers are invited to join has been begun by the Maxwell Motor Co. of Detroit, to educate motorists to the fact that it is within their power to prolong for years the original glossy finish which their cars bear at the time of purchase. In furthering this campaign the Maxwell company is enlisting the help of its own army of distributors and salesmen. It has added to the standard equipment of each of its cars a can of polish of a brand tested and approved by competitive trial in its own plants.

"A motor car is finished with greater care than most pianos," declares President Walter E. Flanders of the Maxwell company. "Yet it is freely exposed to the weather of all seasons. Often it is allowed to stand for weeks without washing.

"No combination of paint and varnish, no matter how well laid on or how carefully hand-rubbed can survive rough treatment indefinitely without losing its elasticity and luster. A good polish is essential, especially in seasons of extreme temperatures.

Old Hickory Light Truck Sells for $785

Four-Cylinder Lycoming Power Plant—Has Speed of 20 m.p.h. on Direct Drive



Old Hickory truck, made by Kentucky Wagon Mfg. Co.

THE latest product of the Kentucky Wagon Mfg. Co., Louisville, Ky., is the Old Hickory, light model delivery truck, 1,250 pounds' capacity, one of the new lines for 1916.

This new light model is built to liberal specifications throughout, and owing to the prevailing tendency of drivers to overload, particular care has been exercised in the design and construction to provide an unusually wide margin of reserve power and strength in both the motor and chassis.

This structural strength is conserved by having all brackets and fastenings on the main frame made through the web of the channels. There are no perforations through the flanges to weaken the frame.

A new and decided feature of the construction is in having the front cross-member of the main frame to serve as a bumper. It extends on either side to protect the wheels. Another feature is the mounting of the radiator on springs to take up the vibration, thus relieving it from the shocks of the road. The radiator is protected further from possible damage by the bumper as it sets well back of the front cross-member.

The truck has 110-inch wheelbase with a frame of rolled channel steel instead of the usual pressed shapes used in many chassis of comparative capacity. It has a 3¼ by 5, four-cylinder, Lycoming motor with 6 to 1 reduction to the bevel drive on the rear axle, furnishing a surplus of power and capable of 20 miles per hour on direct drive under capacity load.

Hyatt roller bearings are used throughout, nickel steel gears in transmission, three speeds forward and one reverse, the sliding gear being equipped with ball bearings. Center control with emergency brake lever and foot brake are in use.

Another feature which is said to be exclusive on this truck is in having an extension on the brake pedal which engages the heel of the driver's shoe, thus permitting him to operate the accelerator without removing his foot from the brake pedal.

Other features of this model are a three-point suspension on the motor, and three-point suspension for the rear axle through two elliptic springs at the rear and the torque tube yoke secured to side channels. All spring hangers are of forged steel. Straight-line drive through one universal when under capacity load. The brake linkage is under spring tension.

It has worm and gear steering with 18-inch wheel. The truck is equipped with the Dyneto electric starter and Connecticut ignition.

The truck has demountable rims and 33 by 4 tires, non-skid in rear. The standard finish is burnt orange body, wheels and hood, with black enameled fenders and gear, hood and fenders being baked.

The price, chassis only, is $785, with open express body $825, f. o. b. Louisville, Ky. Any type of body furnished.

CASE REPORTS PROFITS

Racine, Wis., March 17—The annual report of the J. I. Case T. M. Co., Racine, Wis., just issued, shows that while gross sales fell somewhat below those of 1914, the earnings are very much higher. The gross sales of 1915 were with one exception the largest of any year since the company was established in 1842 and amounted to $14,058,631. Earnings for 1915 were $1,931,824, compared with $966,697 in 1914. After paying $850,000 in preferred dividends and making an appropriation of an additional $500,000 for contingent losses, the earnings were equal to 7 per cent on the $8,300,000 outstanding common stock. The preferred stock outstanding is $12,150,000.

The company during 1915 liquidated $1,000,000 more of the $12,000,000 bond issue of February 1, 1914, and thus far has redeemed $2,500,000, leaving $9,500,000 outstanding. This is to be taken care of by three annual payments of $500,000 in 1916, 1917 and 1918, followed by eight annual payments of $1,000,000. The record of gross sales for the last 4 years is as follows: 1912, $14,026,633; 1913, $13,417,405; 1914, $14,395,384; 1915, $14,058,631.

From the Four Winds

FORBID Shooting from Motor Cars—The committee on fisheries and game of the Massachusetts legislature has reported a bill providing that no person shall shoot wild birds or game from any motor vehicle.

Cheating the License Bureau—Among Kentucky motorists, 250 are delinquent for 1916 licenses, according to State License Inspector J. W. Ross. Warrants already have been issued for seventy-five owners, and warrants for the others will follow. Some of the number are accused of using old tags and a few of employing fictitious tags.

Hauling Dynamite on High Gear—One of the new Kissel worm-drive trucks, built to carry a ton, was loaded with forty-six boxes of giant powder at Boulder, Colo., last week and driven a mile up the canon. It made the distance, over a continuous up-grade, in 3 minutes 50 seconds. It requires four horses 1 hour 25 minutes to pull the same load over the same road.

Touring in Gulf Islands—A motor car trip of 148 miles, covering the entire lengths of Mustang and Padre islands, off the coast of Texas, beginning near Point Isabel, Tex., and ending at Tarpon, Tex., was recently made by a party of south Texas men, consisting of J. E. Cotter, Dr. J. A. Orr, Captain Cooper Walker, P. T. Donohue, A. M. Roberts and Thomas Mathews. The party traveled in two cars and followed the hard, sand beach course on the Gulf side of the islands. Only a few small obstructions in the way of drift were encountered. It is planned to connect the lower end of Padre Island with the mainland at Point Isabel by means of a motor car ferry. There is already a boat service between Tarpon and Rockport, Tex., on the mainland.

British Columbia Registration—According to a recent computation, there were at the end of November, 1915, 9,100 motor cars registered in the Province of British Columbia, against a total of 6,387 at the corresponding month the year previous, showing a gratifying increase over the past year, despite financial depression and many other set-backs. In November, 1914, there were 2,578 cars registered in Vancouver; the following November this total had jumped to 3,719. In November of the former year there were registered 1,760 cars, this total increasing to 2,363 in November of last year. Against Vancouver's 3,719, Winnipeg shows a registration of 3,688, with an insignificant increase over the former year; the whole of the Province of Manitoba shows a registration of only 7,811, in comparison with the 9,000 odd used by the inhabitants of the sparsely populated Province by the sea.

Federation Changes Name—Of the 100 motor car clubs forming the Canadian Automobile Federation, ninety were represented at the annual meeting, held March 8, at the Palace Viger hotel, sixty of these being Ontario clubs, which were represented by officials of the Ontario Motor League, the remainder being motor bodies as widely separated as Quebec, Que., and Leathbridge, Alb., with Manitoba figuring strongly. Among the important decisions reached at the meeting were the change of the name to the Canadian Automobile Association; the creation of an honorary presidency and of provincial directorships, and the institution of quarterly meetings of the executives. O. Hezzelwood, Toronto, was named honorary president and L. R. Howland, Toronto, president. On motion of L. C. Baupre, the Quebec government will be asked to build a good road from Quebec to Valcartier as a military necessity, and to study the possibility of a highway from Quebec to New Brunswick, following the south shore of the St. Lawrence and the Matapedia valley.

Car for Every Nine Persons—The Commercial Club of Larned, Kan., plans a 260-mile tour with 100 cars in line to Kansas City, Mo., this spring, to advertise the fact that Pawnee county, of which Larned is the county seat, owns more motor cars per capita than any other county in the United States. Figures given out recently by state officials at Topeka show that one machine is owned in Pawnee county for every nine inhabitants.

Unlicensed Taxis in New York—A driver of an unlicensed taxicab in New York City may solicit passengers in railroad stations and answer calls from private residences, hotels, theaters, apartment houses and private garages without violating a law, said Judge Wadhams in general sessions when he held that three drivers for the Mason-Seaman Co. were illegally fined $50 each in the magistrates' courts. He reverses the conviction and lays down some new rules governing the public cab ordinance. Judge Wadhams says regarding the hiring of taxicabs at hotels: "It is not different in principle from taking a cab by call from an apartment house, restaurant, theater or private residence. If the fare is solicited upon the street the driver of the cab must comply with the ordinance. If the cab is called to a hotel at the request of the fare from a private livery or garage and has no meter affixed, then it is not within the purview of the ordinance."

Emery Dust in Crankcase—The meanest man in the world lives in Miami, Ariz. He poured several handfuls of emery dust into the crankcase of Carl Elton's new Studebaker. D. E. Meloy, agent for the Studebaker at Miami, offered a reward of $100 for the arrest of the miscreant, but without result. Mr. Elton is wholly at a loss to understand why the trick was done.

Army Officer Must Pay Tax—Army officers are "regular folks" in Arizona and must pay taxes on their motor cars, even though they are kept on a military reserve. This was the reply of Attorney General Wiley Jones to an inquiry from the assessor of Cochise county, who stated that Captain Charles J. Nelson, an officer at Fort Huachuca, had refused to pay taxes on his car. The attorney general stated that as long as the car belonged to Nelson personally and not to the government, he must pay taxes the same as any citizen.

Semaphores Without Lettering—New semaphores were installed at street intersections in Detroit, Mich., last week. They do not bear the words "Go" and "Stop," as heretofore. They have a much larger lamp consisting of a large railroad switch lantern, with extra large green and red discs. They will throw light a mile distant, according to the officials of the traffic department, who declare also that there is no longer any need for lettering on the semaphores, as by this time the public knows quite well the meaning of the red and green colors or lights.

Women in Chauffeurs' School—The school of the Y. M. C. A. at New York has proved that women have a mind for mechanics as well as for millinery, the flare skirt and tango. The class at this school has a number of men and about a dozen women members. In order to win a chauffeur's certificate they must absorb a lot of technical motor information. That the women members are doing so is shown by their examination papers. Not one of their number has fallen below 90 per cent rating, and three of them have 100 per cent. The women must learn the difference between a cog and a carbureter, and also locate and remedy engine troubles. Instead of bossing the job, they must get out and get under. Mother Hubbards are used for this purpose. There are more than a thousand women auto drivers in that city and the number is increasing every day.

Maryland Wants Toll Abolished—All motorists along the Atlantic seaboard are interested in a movement which has been inaugurated before the Maryland legislature, the object of which is to bring about a reduction in tolls charged for crossing the bridge spanning the Susquehanna river between Perryville, Md., and Havre de Grace, Md. An effort is being made to have the state take over the bridge and abolish the tolls or place the matter under the control of the public service commission, with a view to obtaining a reduction in the charges. The bridge was formerly the property of the Pennsylvania Railroad Co., and when it was owned by the company the railroad had to carry foot passengers across free on the trains. Vehicles had to seek other means of crossing. It is on the direct line between New England points, New York, Philadelphia, Wilmington, Baltimore, Washington and the south.

Coming Motor Events

SHOWS

March 28-31—Saginaw, Mich., show.
April 1-8—Butte, Mont., show.
April 10-15—Seattle, Wash., show.
April 12-15—Calumet, Mich., show.

CONTESTS

March 19—Los Angeles, Cal., speedway race.
April 8—Corona, Cal., boulevard race.
May 6—Sioux City, Ia., Speedway race.
May 13—New York, Sheepshead Bay speedway race.
*May 20—Chicago speedway amateur's race.
*May 30—Indianapolis speedway race.
May 30—Tacoma, Wash., speedway race.
May 30—Minneapolis, Minn., speedway race.
*June 10—Chicago speedway race.
June 28—Des Moines, Ia., speedway race.
July 4—Minneapolis speedway race.
July 4—Sioux City speedway race.
July 4—Track meet, Coeur d'Alene, Ida.
July 15—Omaha, Neb., speedway race.
July 15—Track meet, North Yakima, Wash.
August 11-12—Hillclimb, Pike's Peak, Colo.
August 5—Tacoma speedway race.
August 18-19—Elgin road race.
September 4—Indianapolis speedway race.
September 4—Des Moines, Ia., speedway race.
September 4-5—Track meet, Spokane, Wash.
September 16—Speedway race, Providence, R. I.
September 29—Track meet, Trenton, N. J.
September 30—New York, Sheepshead Bay speedway race.
October 7—Omaha speedway race.
October 14—Chicago speedway race.
October 19—Indianapolis speedway race.

* Sanctioned by A. A. A.

Pickups from Among the Good Roads Activities of the Week

STEEL Bridge Over Quinnipiac—A steel bridge is being erected by the Connecticut state highway commission over the Quinnipiac river, in Milldale, Conn., to replace the old wood structure. One-half of the bridge is in New Haven county and the other half in Hartford county, and the expense will be shared.

Extension of Forrest Highway—The Forrest highway, between Atlanta, Ga., and Birmingham, Ala., is to be extended to Mobile, Ala., according to plans made at a recent meeting. It will pass through Montgomery, Greenville, Evergreen, Brewton and Bay Minette. The construction of two branches between Greenville and Bay Minette is probable, as there is much competition between the two sections.

Oppose Road Diversion Plan—Louisville, Ky., good roads advocates will be prepared to oppose an attempt to divert travel over the Eastern Dixie highway by way of Knoxville and Cincinnati, instead of the western branch through Nashville and Louisville, but will do their part in persuading the officials of several counties on the western branch in Tennessee to live up to pledges made to the directors of the Dixie Highway Association, according to statements made by officers of the Louisville Automobile Club last week.

Rivalry Over Jefferson Highway—The fight for the location of the Jefferson Davis highway may be taken to the Mississippi legislature for decision, owing to the warmth manifested by the contending factions of the eastern and western hill and delta counties. A resolution has been introduced in the legislature calling upon that body to fix the official route of the highway. It is expected that a meeting of the delegates will be called shortly in Jackson, Miss., in order to give both sides an opportunity to present their claims.

Texas Highway Men Convene—At the annual meeting of the Texas Good Roads Association, to be held in Taylor, March 16 and 17, every county in Texas where roads have been or are being improved or work is projected, and this includes practically all, will have one or more delegates present. Matters are to be considered that will interest all sections of the state and officers for the year will be elected. Three years ago this state was thirteenth in good roads mileage; today it is in third place, New York and Alabama being slightly ahead.

State Road to Lumber Region—The state highway commission of Maine will award the contracts shortly for completion of the new road which will tap the Moosehead lake region, opening up for tourist travel a route passing through the forests and lumbering region of the state. It is planned to complete all links in the road by July 1. This will be the second highway to enter the district of Moosehead lake from the south. It approaches the lake from the west, via Jackman and Rockwood. It terminates at Kineo, on the lake, which is the eastern boundary of Somerset county.

Highway Across Arkansas—Initial steps toward the building of a north and south road across Arkansas which it is hoped will be designated as a part of the Jefferson highway, to run from Manitoba, Can., to New Orleans, were taken at a recent meeting at Fort Smith, attended by 800 leading citizens. The tentative route passes through Oklahoma, but as the final decision will not be made for 2 years, the people of Arkansas feel that they have an excellent chance. The delegates voted that the road shall be hard surfaced throughout. Scott county has agreed to give a cash bonus of $10,000 and to build a steel bridge over every stream. As a preliminary to the general conference meetings were held in each county through which the road will pass. Every county pledged itself to have its link completed before the time set for decision

Golden Belt Club Organizes—C. M. Harger, president of the Golden Belt Highway Association, has announced the formation of a Golden Belt Club for advertising and marking the highway through Kansas. An active campaign will be started to obtain 1,000 members who will pay $1 per year for five years.

Dixie Highway in Local Tangle—Believing that the entire western leg of the Dixie highway and the Dixie Bee Line are endangered by the failure of the residents of Rutherford county, Tennessee, to vote bonds for the purchase of the turnpikes, the Nashville Automobile Club, the Chattanooga Automobile Club and the Dixie Highway Association are prepared to take whatever action is necessary to insure a good highway between Nashville and Chattanooga. Unless absolute guarantees are given by Rutherford county before the meeting of the Dixie highway commissioners at Macon, Ga., on March 25, the men responsible for the location of the Dixie highway in this state will route the highway differently as far as can be done in the few days remaining before the final decision is made by the entire association.

Motor Cars for New Roads—Six months ago there was but one motor car in Montgomery, Tex. Now there are a dozen or more, and others looked for. The reason is that Montgomery county now has good graded roads running through the county from the Walker county line west via Conroe to Harris county.

Women Boost Dixie Route—A group of women of Bibb county, Ga., have organized a women's auxiliary of the Dixie Highway Association and have arranged to donate trees which will be planted along the highway by the county. In order to pay the expenses of their council, the women have secured permission from the Dixie Highway Association to retain $1 from each $5 dues paid by members of the council.

Minnesota Allots Road Funds—The three large counties of the state get $50,000 each as their allotment from the $1,500,000 state road and bridge fund, these counties being Hennepin, Ramsey and St. Louis, in which are situated, respectively, Minneapolis, St. Paul and Duluth. They contribute together about 50 per cent of the fund. The largest sum that may be allotted to any county is 3 per cent. All of the motor vehicle tax, after deducting the cost of administration, goes into this state fund.

Re-Surface Virginia Pike Road—The legislature of Virginia has granted a charter to an association known as the Warrenton & Fairfax Turnpike Co., Inc., which will take over the old Alexandria-Warrenton pike, to grade and re-surface the road and operate it as a toll-road until the State wishes to take it back. The charter states that when the state does take it back it must pay the stockholders the cost of the road, with interest, minus dividends. Mitchell Harrison is president of the company and Thomas R. Keit, vice-president.

Iowa's Road Fund Large—Iowa automobile registrations for 1916 have passed the 100,000 mark. The amount of registration fees paid to the state treasury so far this year has been over $1,000,000. This amount is expected to increase to $1,500,000 by April 1, when the semi-annual distribution of the fund among the ninety-nine counties of the state will take place. The fund will be by far the greatest good roads melon ever cut for the counties of the state and its early distribution will permit the carrying out of many good roads plans this year.

Eastern Kentucky Gets Attention—The Kentucky Good Roads Association announced this week that plans were being developed for pressing good roads construction in eastern Kentucky, where it is much needed. The association has called upon Lexington, which will be one of the chief beneficiaries, to do its part in the cause. Louisville pays into the treasury of the association more than $2,000 in membership fees annually. Lexington has no members. This condition, it is declared, the citizens of Lexington should no longer permit to exist.

New Link in Sunset Highway—Work has been commenced on another link of the famous Sunset highway across the Cascade mountains between Vantage on the Columbia river and Ellensburg, Kittitas county, Wash. An expenditure of $29,000 will be made on this section and when done it will open up a new road, cut down mileage and afford travelers scenery which they are not now afforded, by the old route from Vantage west. The new road will begin at Vantage, the ferry point on the Columbia river, and proceed east toward Ellensburg, passing through the Snebely canyon.

With the Motor Clubs

BEST Season for St. Joe Club—The St. Joseph Automobile Club, St. Joseph, Ma., has received 178 applications for membership since January 1, as the result of a consistent effort to bring all local motorists into the club. Numerous calls for information on summer tours are coming to the club and more tourist travel through St. Joseph is expected this year than ever before.

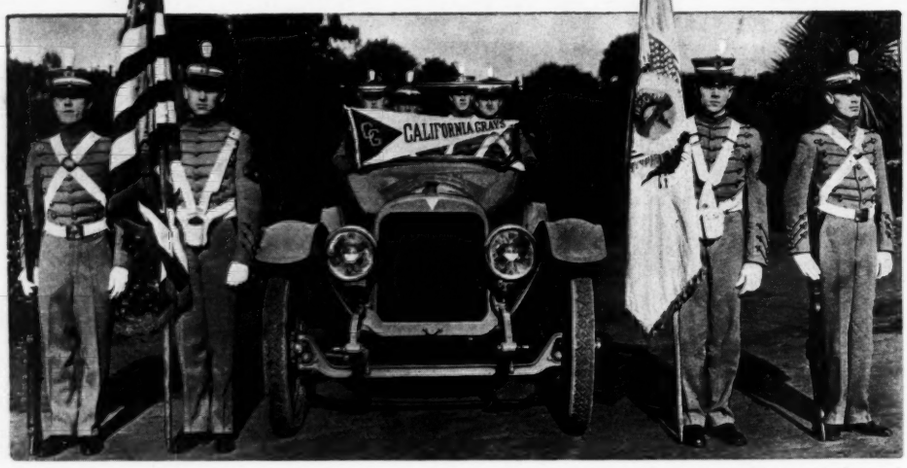
Offer Reward for Thieves—The Automobile Club of Hartford, Conn., has put a price of $50 on the motor car thief. The club will pay this amount for the apprehension of anyone who steals a car belonging to a member of the club. There have been several thefts during the last 2 months. Apparently they were the work of joy riders who abandoned the cars some distance from the city.

Invitation to Minnesota Motorists—The Brainard Auto Association, Brainard, Minn., has extended an invitation to the state association of motor clubs to arrange a tour to Brainard this summer. The board of governors is planning to place signs on all roads in the country. An election was held this month at which John F. Woodhead was chosen president; Clarence A. Olson, vice-president, and C. E. Hansing, secretary.

Club Will Conduct Show—The Rotary Club of Superior, Wis., which conducted a successful industrial exposition and motor show in 1915, has announced that the second exposition will be held during the week of March 6 in the Truax building. As a year ago, the motor division will be the feature of the show, and on the opening night a huge motor parade will be held on the streets of Superior to celebrate the opening of the show. The parade will be in charge of the Superior Automobile Club.

Panama Club Joins A. A. A.—Latest to join the 600 odd state and local organizations included in the American Automobile Association is the Panama Automobile Club with a membership of 150 and a representative list which includes men who have lived and motored in all parts of the United States. Though there are only 26 miles of traveled highway in the Canal Zone, and even less in the Republic of Panama, with restrictive laws sadly out of date, the Panama motorists find self-propelled vehicles a pleasureable necessity which approaches a luxury because of registration taxes averaging $30 per car.

Among the Makers and Dealers



MILITARY ORGANIZATION BUYS GRAY CAR TO MATCH UNIFORM—The California Grays, San Francisco's select military organization, recently purchased a Hudson through the H. O. Harrison Co., San Francisco. On special order to the factory it was finished in pearl gray. The car creates considerable comment in the California city and when filled with uniformed men is rather striking in appearance.

HESS-BRIGHT Co. Will Build—Philadelphia contractors are making estimates on the erection of a factory addition to the plant of the Hess-Bright Manufacturing Co., makers of ball bearings.

Make Tires in St. Louis—The Union Tire and Rubber Co., recently incorporated in Delaware with a capital of $500,000 to manufacture automobile tires, has acquired the former plant of the Banner Rubber Co. at St. Louis, Mo.

Chandler Production Climbs—The Chandler Motor Co., Cleveland, O., has on its books orders for 80 per cent more cars than were delivered during the entire twelve months of 1915. The factory is running on a largely increased schedule, and shipments in February showed an increase over figures for February, 1915, of 300 per cent.

Goodyear Opens New Warehouse—The Philadelphia branch of the Goodyear Tire and Rubber Co. has increased its business to such an extent that additional quarters have been added at Twenty-fourth and Locust streets. The new warehouse contains 23,180 square feet of floor space and will accommodate 25,000 tires.

New Record at Ford Factory—The Ford Motor Co., Detroit, Mich., made and shipped 2,430 automobiles within 24 hours on the last day of February, breaking the former record of the company by 330 cars. On the same day a total of 1,692,390 pounds of steel was unloaded on the premises, this being the contents of nineteen full carloads. This is also a new unloading record for the company.

Milwaukee Factories Run at Capacity—Milwaukee motorcar and truck builders are still being pushed to the utmost limits of their factory capacity by the extraordinary rush of orders. Although greatly hampered by the difficulty in getting raw, semi-finished and finished materials, as well as a shortage of skilled labor, practically every plant is now working 24 hours a day. The Stegeman Motor Car Co., which has been working overtime for eight months, has put on full day and night shifts in double crew form. It has recently booked extensive orders for Stegeman trucks, all for domestic users. No orders for export and special war cars have been accepted because of the home demand.

Buick Officers for 1916—Officers and directors for the current year of the Buick Motor Co. are the following: Charles W. Nash, president and general manager; C. S. Mott, vice-president; T. S. Merrill, secretary; James T. Shaw, treasurer; Floyd A. Allen, assistant secretary-treasurer, L. F. Oland, controller. The directors are Messrs. Nash, Moot and J. J. Storrow, Boston, Mass.

The Show Circuit

Spring Show in Salesrooms—A spring motor show will be held by the members of the Milwaukee Automobile Dealers' Association, each of the thirty-seven members staging his own show in his own salesrooms. The dates of the exhibition will be April 14 to 16.

Montana State Show—Generous advertising in the form of newspaper articles sent over the state, railroad coöperation, and special rates from all Montana cities to Helena, where the show will be held from March 21 to 25, give assurance of the First Montana Motor Car Show being a notable success.

Hartford, Conn., Show Profitable—A substantial dividend, larger than that of one year ago, has been declared by the Hartford, Conn., Motor Car Dealers' Association on the recent 7-days' show at the state armory. The old officers were reëlected as follows: L. H. Elmer, president; Edward S. Clark, vice-president; John D. Evans, treasurer; A. C. Rose, secretary.

Clinton, Ia., Exhibition—The first motor show to be held in Clinton, Ia., has more entrants than can be accommodated in the Clinton Coliseum. It has been necessary to engage space at the Lafayette hotel.

Motor-Fashion Show Popular—Springfield, Ill., held its annual motor show from March 14 to 17, one of the features being a fashion show at which living models exhibited the spring styles. The models were brought from the fashion centers of Chicago. Late applicants for entries had to be refused on account of overflow demands for space.

Ford Doubles Sales Force—The Ford Motor Co. has issued instructions to the managers of its fifty-one sales-branches to double the number of salesmen in the respective territories covered by each branch. At the same time the number of Ford dealers is being increased continually and has grown from 6,000, last August, to more than 8,500 at the beginning of March. Additions to the branch factories at Denver, Colo., and Columbus, O., are under construction. Work will soon be started in doubling the parent plant at Detroit, Mich.

Service Increases Capital—The stockholders of the Service Motor Truck Co., Wabash, Ind., recently voted to increase the capital stock of the company from $250,000 to $450,000. The new issue of stock has practically all been subscribed by the present stockholders. Two additions to the factory have just been completed which practically double the capacity of the plant, but the directors of the company anticipate that this increase will not be large enough to take care of the business and are planning the erection a large new plant in the near future.

B. F. Goodrich Co. Pays Dividend—The B. F. Goodrich Rubber Co., Akron, O., has declared a regular quarterly dividend of 1 per cent on the common stock, payable May 15 to stock of record May 4. The following have been elected directors of the company to fill the increased places on the board, and one to fill the vacancy of A. H. Wiggin, resigned; W. O. Rutherford, A. B. Jones, Dr. W. C. Geer, H. E. Joy and H. K. Raymond. This makes the present number of directors eighteen. At a meeting of the directors, officers of the Goodrich company were re-elected. They are as follows: President, B. F. Work; secretary, C. B. Raymond; treasurer, W. A. Means. H. E. Raymond is retained as sales manager. At a

special meeting of the stockholders of the company, the authorized preferred issue was reduced from $28,000,000 to $27,300,000.

Hupmobile's Duluth Agency — Theodore Furlund, Duluth, Minn., announces that he has taken over the Hupmobile agency for that territory. Charles Hopping has arrived there from San Francisco to take charge of the sales department.

Election of Weston-Mott Co.—The Weston-Mott Co., Flint, Mich., has elected the following officers and directors for the current year: C. S. Mott, president; H. H. Bassett, vice-president and general manager; T. S. Merrill, secretary; James T. Shaw, treasurer; A. C. Anderson, assistant secretary-treasurer; H. J. Mallery, comptroller. The directors are C. S. Mott, Charles W. Nash and H. H. Bassett.

Morgan & Wright Increase Output—The plant of Morgan & Wright, tire makers, Detroit, Mich., was recently enlarged, giving 45,000 additional sq. ft. of floor space. Further extensions are contemplated. The concern recently purchased a tract of land 392 feet by 500 feet, adjacent to its present plant. A force of 3,000 men is employed but is to be gradually increased to 4,000 or more. Production is also to be increased from an average daily output of 7,000 tires to at least 10,000 tires.

Milwaukee Dealers' Committees—The Milwaukee Automobile Dealers, Inc., has selected the following principal committees for the ensuing year: Shows, N. E. Osmond (Jeffery and Auburn), chairman; L. D. Frint (Olds and Chevrolet); A. W. L. Gilpin (Ford); tours, Edgar F. Sanger (Stearns and Hupmobile), chairman; Harry Newman (Chalmers); W. R. Rafter (Winton); legislation, Jesse A. Smith (Hudson), chairman; Emil Estberg (Maxwell); M. J. Monson (Buick), W. P. Upham (Oakland).

Harry Newman Missionaries—Harry Newman, Inc., Milwaukee, Wis., distributor of the Chalmers in Wisconsin, upper Michigan and adjacent territory, has added two former Studebaker men to his Milwaukee staff, viz., H. H. Batcheller, formerly of the Chicago Studebaker branch, and L. S. DeLand, since 1910 sales manager of the Studebaker for Wisconsin in Milwaukee. Both men will travel through the Newman territory and co-operate with Chalmers dealers, being two of the six "missionaries" appointed by Mr. Newman.

Krueger Handles Cole Milwaukee Business—W. H. Krueger, formerly of the Boulevard Garage Co., Milwaukee, Wis., has taken charge of the Milwaukee business of the Cole Motor Co., of Chicago. An efficient service department for Cole owners has been established in Milwaukee. F. E. Tabbert is associated with Mr. Krueger as manager of the retail sales department.

Parrott Tractor Co. Organizes—A new tractor company has been organized in Jackson, Mich. It is the Parrott Tractor Co., of which B. R. Parrott is president; Louis Goodhart, vice-president and sales manager; and M. N. Stewart, secretary-treasurer. The plant of the former Fuller Buggy Co. has been secured by the concern. The tractor is to be of the one-wheel type, the wheel and engine being in the center. The body is to be practically an ordinary motor car body.

A-K Ships 3,025 Systems in 1 Day—On March 1st, the Atwater Kent Mfg. Works shipped from the factory 3,025 ignition systems. This shipment comprised standard equipment and orders filled to jobbers, dealers and owners. Some idea of the enormous increase in business of the Atwater Kent Mfg. Works can be gained from the fact that this 1 day's shipment is equal to one-half of the entire year's output of 5 years ago. The plant is running full force. The business of January, 1916, was 2½ times as great as that of January, 1915.

New Haven Embargo Hits Dealers—Motor car dealers of Hartford, Conn., are confronted with a serious situation because of the embargo which is now on along the New Haven system. For some time past local agents have had cars shipped to points in New York and Massachusetts and then driven them over the road to Hartford. The Hartford Automobile Dealers' Association will send a committee to call on the interstate commerce commission and determine if some arrangements cannot be made to ship cars. A committee was appointed to confer with the New Haven road officials regarding the freight embargo which has had a serious effect on local business.

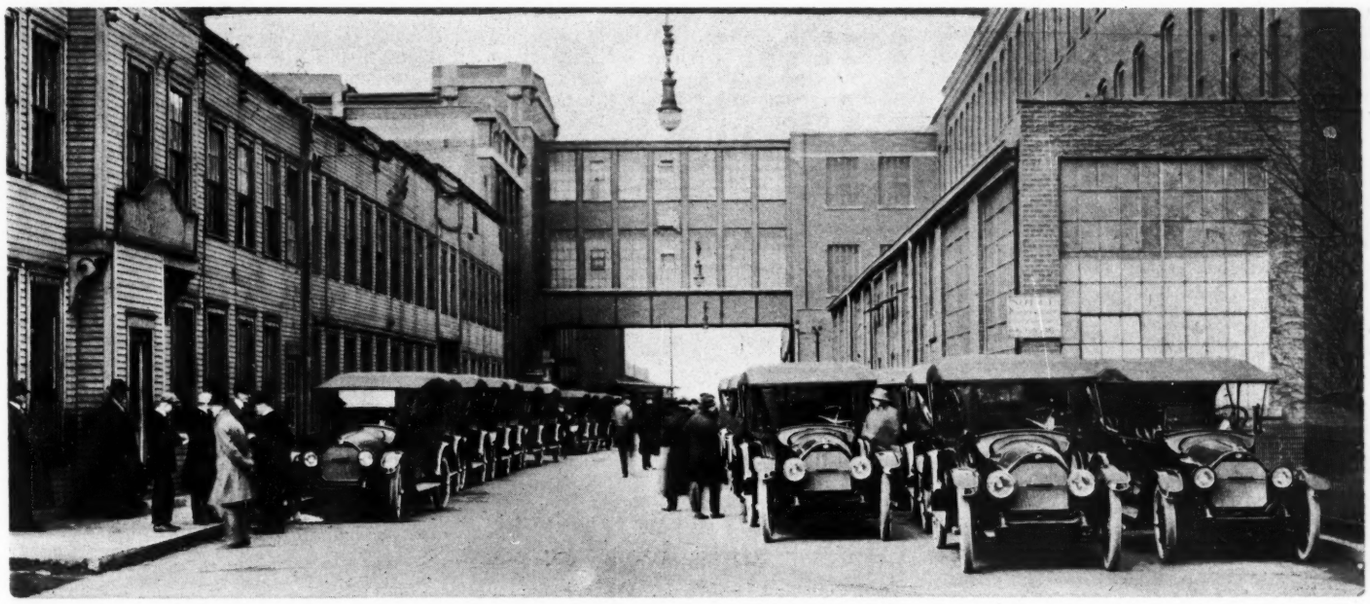
Callender Leaves Case—Angus R. Callender, for several years chief clerk of the manufacturing department of the J. I. Case T. M. Co., Racine, Wis., has purchased the Badger Foundry Co., and resigned his position with the Case company to take the general management of the business.

Stock Report for Goodrich Co.—The B. F. Goodrich Rubber Co. has opened a branch office in Duluth, with Robert G. Ray, formerly of the St. Paul, Minn., branch, in charge. The Duluth office will serve as a stock depot for dealers in northern Minnesota and Wisconsin.

Occupy New Bowser Quarters—The contractor is putting the concrete roof on the building just east of the main office at the plant of S. F. Bowser & Co., Fort Wayne, Ind., and it is expected to have the building ready for occupancy by April 1. It is 40 feet by 60 feet, and five stories high. The lower floor will be used for a dead-storage vault and the upper floors for offices.

Overland Opens Building with Dance—When one of the new factory buildings of the Willys-Overland Co., Toledo, O., was completed a few days ago, a dance was given before the machinery was moved in. It was found that the big structure was not large enough to accommodate all the employes who planned to come, so three nights were set aside and over 6,000 people participated. Music was furnished by the Overland concert band of fifty pieces, made up entirely of Overland employes.

Joint Factory Agreement—The John Dornfeld Co., Watertown, Wis., owning a machine shop, and structural iron, boiler and tank-works, has entered into a contract with the Brillion Implement Mfg. Co., gasoline engines, Brillion, Wis., for the joint manufacture of a general utility farm tractor and truck. The Brillion Company will manufacture the engines and the Watertown firm the chassis complete. The product will be distributed and marketed from Watertown. The tractor is a Brillion de-



OVERLAND DEALERS DRIVE AWAY CARS—The extraordinary winter demand for motor cars when considered with the widespread car shortage has brought about a condition without precedent in the industry. It is no novel thing for dealers, located near factory, to have cars delivered to them at the factory in good weather and to drive them home. It is decidedly novel, however, to see more than a hundred dealers and their employes, some coming from points 200 miles distant, in the midst of a terrific snowstorm, and driving home over roads well nigh impasable in places, to get cars to deliver to waiting customers who are unwilling to take chances on demoralized freight deliveries. This was the condition at the Willys-Overland plant at Toledo, O., last week when 132 cars were delivered to dealers coming from all parts of Ohio, Michigan and Indiana. Above is a lineup of some of the cars taken away by the dealers. With the marked decrease in freight cars manufacturers have scouts out looking for available rolling stock.

sign and arranged for manifold purposes. About 75 men will be added to the Dornfeld payroll at once.

Iams Goes to Cleveland—J. E. Iams has become sales manager of the Cleveland Motor Car Sales Co., Cleveland, O., distributor of the Haynes, Hupmobile and Jeffrey cars. He was formerly associated with the motor car business in Pittsburgh.

Hupmobile Has Omaha Branch—The Hupmobile Co. of Nebraska has filed papers of incorporation in Omaha, Neb., and will open a factory branch in that city for wholesale distribution in Nebraska territory. Temporary offices have been secured with the McShane Motor Co., 2054 Farnam street. Oliver D Hutchinson, branch supervisor, is in charge.

Canadian Overland Distributor—The business of the Russell Motor Co., at Winnipeg, Man., has been transferred to the Western Canada Motor Car Co., and the cars manufactured by the Canadian Overland company will be handled in Manitoba by this company. S. Doupe, recently manager of the Winnipeg branch of the Russell Motor Car Co., has joined the staff of the Breen Motor Co.

Fort Wayne Dealers Coöperate—Plans are now under way for the organization of a company in Fort Wayne, Ind., to handle second-hand motor cars in which each member of the Auto Trade Association will take stock. The intention is to handle all the second-hand motor car business in the city through the new company instead of the various dealers doing it separately as is now the case.

Change of Ownership—The controlling interest in the Alloy Steel Spring Co., Jackson, Mich., has been acquired by Frank W. Gay and R. W. Smith, respectively former secretary-treasurer of the American Gear & Mfg. Co., and treasurer of the Smith-Winchester Co. Fred J. Keiser, who was president of the Alloy company, sold out his interest, but remains as general superintendent. Mr. Gay will be manager.

Goodyear Educating Aliens—The Goodyear Tire & Rubber Co., Akron, O., recognizing the need of extending to employes of foreign birth the opportunity of making themselves better citizens of the land of their adoption, and thereby increasing their own efficiency as workmen, is planning to organize classes in the English language and American citizenship, for the benefit of the many men of alien birth in the plant.

Chalmers Erects Building—A new four-story manufacturing building, 60 feet by 400 feet, is being built at Detroit, Mich., by the Chalmers Motor Co. It will be known as building No. 2 and will be used exclusively for the making of parts for Chalmers cars of past years. On the ground floor there will be a number of factory offices and a store room. The structure will have a wing, 50 feet by 60 feet, which, together with the new service building put up recently, will add 156,000 square feet of floor space to the plant, making a total floor space of about 777,500 square feet.

G. M. Davis in Stewart Employ—George M. Davis, who was manager of the Internal Gear Drive Association which he organized last year, has joined the organization of the Stewart Motor Corp., Buffalo, N. Y., in the capacity of sales and advertising manager.

Mechanics Organize Tractor Company—Union workingmen of Janesville, Wis., seeing the possibilities of the gas tractor business, have organized the Janesville Tractor & Engine Co. to engage in the manufacture of a general utility tractor for agricultural purposes.

Los Angeles Cole in Transfer—The Cole Motor Car Co., Los Angeles, Cal., which has been operating a factory branch, has been taken over by James L. Irving, who has been distributer of the Enger in southern California and Arizona for the last year. The Irving Motor Car Co. is now distributer of both lines. Harris has been retained as sales manager by Mr. Irving.

New Concern at Dallas—The Case Automobile Sales Association is the latest addition to the distributing firms of Dallas, Tex. This firm is composed of Hugh C. Couch, M. G. Scovell, and L. E. Couch. For the present the headquarters of the company will be with the J. I. Case Threshing Machine Co. L. E. Couch was formerly distributing agent for Case cars in Texas and Louisiana. They will handle Case cars.

Payment by Defunct Lozier Co.—Creditors of the former Lozier Motor Co., Detroit, Mich., with which the present new Lozier company has no connection, are receiving a fourth dividend, of 7½ per cent, aggregating about $200,000, from the offices of the referee in bankruptcy, Lee E. Joslyn. Three dividends, one of 2½ per cent and the other two of 5 per cent each, have been paid previously to the creditors, amounting in all to about $700,000.

Hupp Takes New District Managers—J. G. Painter and W. J. Walker have been appointed district managers by the Hupp Motor Car Corp., Detroit, Mich. Mr. Painter has had charge of the technical service department at the Hupp factory. He will have charge of the important territory of Ohio, Michigan, northern Indiana and a portion of West Virginia. Mr. Walker, with headquarters in Winnipeg, will cover Alberta, Manitoba, Saskatchewan and Western Ontario.

G. & D. Laboratory at Detroit—In order to afford maximum co-operation to manufacturers in Detroit and vicinity, Gray & Davis have established an engineering laboratory at Detroit, Mich. In the past, all engineering problems connected with electric starting and lighting have been worked out at the Boston plant, but under the new plan designers who now use, or are about to adopt, Gray & Davis equipment, will have the services of the Detroit laboratory at their disposal. This, of course, will prove not only a marked convenience, but should greatly enhance efficiency.

Detroit Engineers Hear Perrin—Chief Engineer J. G. Perrin of the Timken-Detroit Axle Co., Detroit, Mich., will be the principal speaker at the next meeting of the Detroit section of the Society of Automobile Engineers which will take place at the Hotel Pontchartrain, March 17. Mr. Perrin will read a paper entitled "Evolution of the Rear Axle."

Federal Promotes de Vault—The Federal Rubber Co. has promoted A. L. de Vault, manager of the local Federal branch, giving him in charge of the central district, which includes the territory of the Detroit, Cleveland, St. Louis and Chicago branches. These branches have been combined and will be under the direct jurisdiction of the Chicago office.

Gramlich to Thermoid—J. E. Gramlich, formerly engineer and superintendent of the Case Motor Truck Co., Syracuse, N. Y., has severed his connection with that company to become associated with the Thermoid Rubber Co., Trenton, N. J., where he will act as engineer.

Receiver for Tire Company—The Toledo-Findlay Tire & Rubber Co., Findlay, O., a concern capitalized at $300,000, has been placed in the hands of a receiver upon the application of A. O. Hamilton, Charles Reick, V. T. Spitler and Henry Hard, directors. The concern was previously known as the Toledo Ford Tire Co., and makes tires especially for Ford cars.

Telephone Man Hupp Vice-President—The Hupp Motor Car Co., Detroit, Mich., has appointed Arthur van Schlegell vice-president of the company. Mr. Van Schlegell is vice-president and general manager of the Michigan State Telephone Co., and will remain in the former capacity with the telephone company, but not in the executive capacity.

Hartford Capital Stock Doubled—The Hartford Auto Parts Co., Hartford, Conn., has decided to remain in Hartford. The stockholders have decided to double the capital, increasing the capital stock from $300,000 to $600,000. The factory is operating 24 hours per day. It is expected that the bench at New Britain, Conn., will be in operation by July 1.

Charging Station for Detroit—The Detroit office of the U. S. Light & Heat Corp. has moved from 203 Monroe avenue to 43-45 Brady street. Manager C. R. Forth is planning the installation of a large battery, repair and charging plant for the care of U. S. L. storage batteries, and will also keep in stock a large supply of batteries and parts. The company's New England office has been removed from 25 Irvington street, Boston, Mass., to Exposition building, Cambridge, Mass.

Recent Incorporations

Chicago, Ill.—Boice Motor Equipment Co.; capital stock, $10,000; incorporators, W. S. Perry, N. G. Croshaw and P. G. Kollauf.

Chicago, Ill.—Auto Specialty & Signal Co.; capital stock, $20,000; incorporators, L. Barllett, H. R. Cook and M. O. Schlesser.

Cincinnati, O.—National Rubber & Specialties Co.; capital stock, $25,000; incorporators, J. E. Bancroft, G. M. Allen, G. W. Drash, C. L. Bondfield, H. L. Gordon.

Cleveland, O.—Mathematical Wheel Co.; capital stock, $10,000; incorporators, F. A. Lukes, A. B. Williams, Will Rounds, M. J. King, H. H. King.

Canton, O.—Stark County Motor Car Co.; capital stock, $25,000; incorporators, A. L. Crowthers, F. L. Fuhr, E. O. Lathamer, H. T. Schaeffer and Edward A. Pierce.

Canton, O.—Auto Owner's Garage Co.; capital stock, $10,000; incorporators, F. E. Widder, G. F. Ebel, W. H. Cordrey, C. B. Gerwig and M. Lytle.

Cleveland, O.—Cleveland Smith Form-a-Truck Sales Co.; capital stock, $10,000; incorporators, Howard Latimer, C. T. Moore, W. E. Case, A. B. Beckman and Robert Young.

Mobile, Ala.—Harrington Motor Co.; capital stock, $19,500; incorporators, C. W. Harrington, H. J. Harrington, J. M. Oliver, H. M. Harrington.

Milwaukee, Wis.—Pathfinder Sales Co.; capital stock, $6,000; incorporators, John I. Glab, F. J. Cassidy and E. A. Glab.

Milwaukee, Wis.—Babcock Automobile Spring Co., to manufacture, repair, retemper springs; capital stock, $15,000; incorporators, R. S. Babcock, C. Babcock and William J. McElroy.

Sturgis, Ky.—Sturgis Auto Sales Co.; capital stock, $15,000; incorporators, T. E. Jenkins, B. F. Humphrey and J. O. McCauley.

St. Joseph, Mo.—Motor Fuels Co., to exploit refining patents, held by Samuel M. Herber; capital stock, $100,000; incorporators, S. M. Herber, J. C. Sanders, J. L. McQueen, William Taylor and Mable Morgan.

St. Joseph, Mo.—Charles R. Kirk Motor Sales Co.; capital stock, $2,000; incorporators, Charles R. Kirk, Don Riley and Alice H. Kirk.

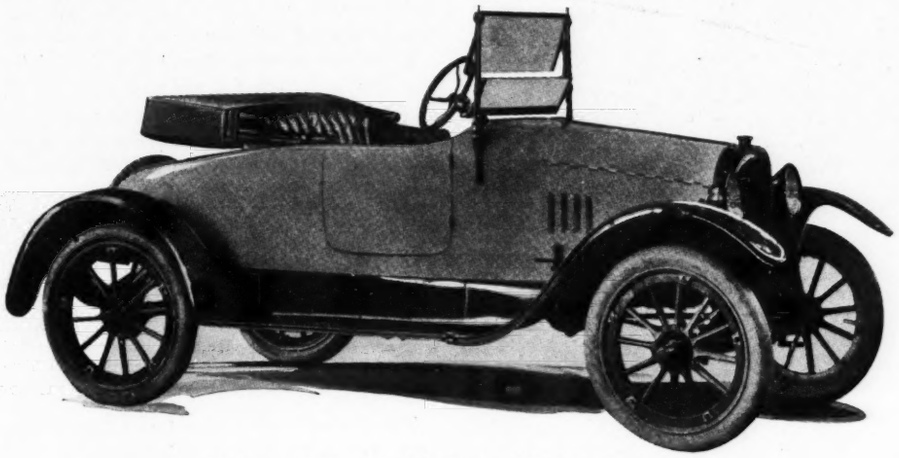
St. Louis, Mo.—Independent Tire Co.; capital stock, $15,000; incorporators, O. Reifler, Anna Reifler, Wm. Chlorine and William Bonnett.

San Antonio, Tex.—Luck Tire & Mfg. Co.; capital stock, $500,000; incorporators, D. A. Walker, C. J. Davis, E. M. Walker.

St. Joseph, Mo.—Farmer Auto Supply Co., to buy, sell, and manufacture motor car supplies, parts, repairs, etc.; capital stock, $10,000; incorporators, S. R. Farmer, C. O. McCauley and C. V. Ayeres.

Toronto, Can.—Saxon Sales Co.; capital stock, $40,000.

Accessory Offerings



Body for Ford cars made by Detroit Auto Products Co.

Bodies For Fords

THE Detroit Auto Products Co., a recent addition to the motor car accessory and parts manufacturers of Detroit, specializes in a metal body and hood equipment for Ford cars, which is termed the De Luxe.

As the illustration indicates, this equipment gives the Ford a very attractive appearance, indeed, and included in the De Luxe outfit which sells for $197.50 are the following parts and accessories:

A pressed steel metal body trimmed deep with Boston artificial leather; a one-man top; black enameled windshield, nickel-trimmed with two adjustable glasses; slightly pointed radiator with zig-zag tubes and fins and curved top; black enameled hood with louvres on both sides, also handles and fasteners; crown fenders, front splash plate, dust shields, running board hangers, lamp bracket extensions, tire holders supporting irons, foot accelerator, starting crank.

The dimensions of the roadster with this equipment are: Back of dash to front seat, 30 inches; cushion, 18 inches wide, 10 inches high in front, 7 inches in rear; body, 45 inches wide at seat.

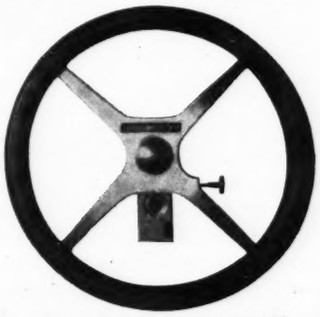
The standard finish is royal green, with black fenders. For other colors an extra charge of $10 is made, plus $10 a set for the fenders if they are to be in some other than standard color. The Ford with the De Luxe equipment weighs 1,540 pounds.

Vincent Steering Wheel

The new Vincent steering wheel, made by the Vincent Clear-Room Steering Wheel Co., Detroit, Mich., is provided with a simple device which permits the wheel to be turned upward into a vertical position with the steering post when the car is not being driven. All that is required is to release the lock and the wheel may be turned up or down at will.

This construction gives a great deal more room for the driver in getting in or out of the car.

Model A is made in three styles, and is for cars which have the spark and throttle levers under the wheel. Style No. 1 is a 16-inch plain rim, ebony finish, for Ford cars, at $5.75; style No. 2 is a 17-inch, corrugated rim, walnut finish, for Ford cars, at $6 and the third style, called the Standard, also has a 17-inch, corrugated rim in walnut finish and sells at $6.50.



A top view of the Vincent steering wheel

Showing how Vincent steering wheel folds out of the way

Model B, made in two styles, is for cars which have the spark and throttle levers above the wheel. Both styles are of the corrugated walnut type, the first one having a 17-inch rim and selling at $9, while the second one, with an 18-inch rim sells at $9.50.

Wilds Tire Guard

The Motor Car Supply Co., Minneapolis, Minn., is marketing a device to be fastened to the fender of the car that is designed to prevent tacks, nails and other sharp articles picked up by the tire from remaining on the tires sufficiently long to penetrate the rubber infabric. The tire guard consists of a flexible light chain, held over and in contact with the tire in the form of a loop by means of brackets attached to the fenders. It is said that this guard prevents any article from remaining in the tire for more than part of a revolution, the result being that in each revolution of the wheel, a clean tire comes in contact with the road, thus materially increases tire life. Price, pet set of four, $5.

Marvel Vulcanizer

In the Chicago show issue of Motor Age, January 20, reference was made to the Marvel vulcanizer as being operated by steam. This was erroneous. The vulcanizer gets its heat from an impregnated cardboard which burns but does not blaze and the burning process is sufficiently long to vulcanize one spot in the tire before replenishing the impregnated cardboard.

Low's 5-Minute Vulcanizer

The Low 5-minute vulcanizer is being marketed by the Five Minute Vulcanizer and Auto Supply Co., Kansas City, Mo. This vulcanizer consists of a horseshoe-shaped piece of metal in one end of which there is a thumb screw and on the other end a round plate about 2 inches in diameter. The tire is placed over the plate, then the patch applied and a small pan which contains the impregnated cardboard that furnishes heat for the process is placed on top of the part to be vulcanized. The thumb screw is turned down until the crow foot attached to the bottom reaches the pan containing the heat, the more pressure being put on the screw the greater the pressure on the tire. The cardboard is ignited and in 5 minutes the vulcanizing process is complete.

Automatic Piston Rings

The Dubois Machine Shop, Inc., Albany, N. Y., has improved its product, the automatic piston ring, which is composed of two concentric unit members fitted one around the other. With the new improvements the automatic piston ring is a com-

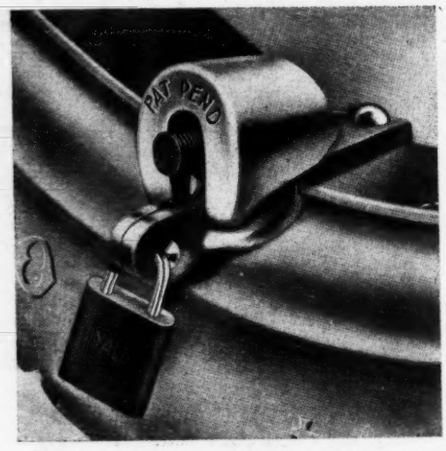
pression ring and vacuum ring in one. The sealing against vacuum is a new feature and said not to be found in other makes of piston rings.

Woods Polishing Cream

The Woods Auto Polishing Co., Galesburg, Ill., is making a polishing cream which is said to prevent cracking and checking of varnish. Only a small quantity is required to polish the car and a dry finish is given that does not gather dust. It is put up in 12-ounce bottles that sell at $1.

Haco Tire Lock

The Howard Automobile Co., San Francisco, Cal., is making a tire lock which is being marketed under the name Haco. The device is illustrated in this department and it will be noted that it is comparatively simple in construction. It is finished in heavy black enamel complete with a Yale padlock and sells for $2.



The Haco tire lock

Harper Trailer

The Harper Buggy Co., Columbia City, Ind., is making a trailer in two sizes, one designed with Timken roller bearings and the other with plain spindles, the former being capable of a speed of 35 miles per hour and the other 20 miles per hour without becoming overheated. The inside body measurement is 8 by 4 by 72 inches, either with or without flare boards. Axles are 1⅛ inch with a carrying capacity of 1,000 pounds, or 1¼ inch with a carrying capacity of 1,500. Wheels are 34 by 1⅛ or 34 by 1¼, fitted with either steel or rubber tires. It has the standard tread. Is finished in black with a blue stripe and is furnished with a connection or hitch by a universal patent and made by the Harper Buggy Co. Prices range from $50.50 to $68.

Sexton Castor Motor Oil

One of the most interesting Chicago developments in lubrication is the new patented castor compound motor oil, which has just been put on the market by the Sexton Oil Co., Chicago, and is being advertised and sold under the trade name of Sexton's castor motor oil.

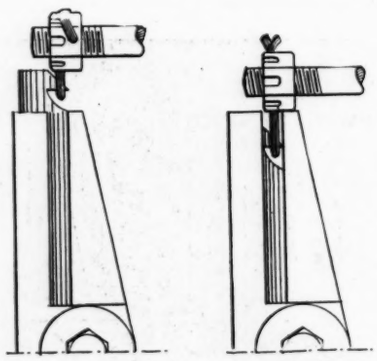
A booklet issued by the Sexton company contains some very interesting facts as to the use of castor as a lubricant, and tells of the development of the Sexton castor motor oil by a series of experiments in which castor oil was compounded with other mineral and vegetable oils, the amount of castor being varied in each case, the result attained being several different grades of oil, each grade being particularly adapted to some certain type of motor.

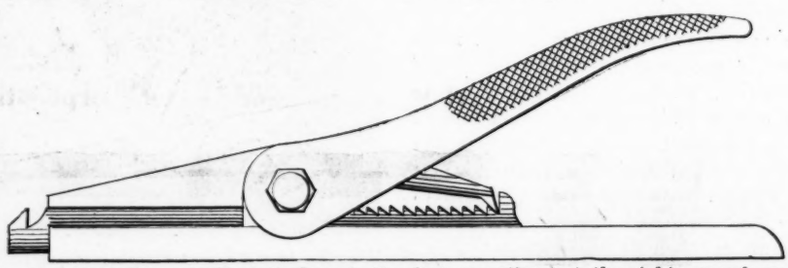
It is claimed by Mr. Rice, the inventor of the oil, that the various properties of this lubricating oil can be determined absolutely through his process by a careful regulation of the amount of castor in the mixture.

May's Cotter Pin Puller

Pulling out bent or rusty cotter pins has been a continual source of trouble and wasting of time for almost every mechanic and car owner. It is one of the meanest jobs encountered in the repair of cars. With a view of lessening this trouble a tool has been invented. It is claimed that it will extract any size cotter pins regardless of their inaccessibility. Very little effort is required to operate this tool. The closing of the handles in a scissor-like manner will easily pull the cotter pin and besides straightening the pin it also holds it; thus the pin may be used again and after it is out there is no chance of it dropping in places where it will cause damage. The tool is made by Harry May, Atlanta, Ga.

Driving device control on steering post





Mays' cotter pin puller. At the left above is the first operation; at the right, second operation, and below, a view of the whole device

New Type of Dimmer

S. E. Vanderveen, Grand Rapids, Mich., has invented a dimmer for motor car lamps which is said to be different from any other dimmer manufactured. It consists of a variable resistance coil encased in steel which is clamped to the steering post of a machine. A brass stem, fitted with a knob, serves as a contact and a switch. At the lowest point it is on neutral and as it is drawn out the light gradually increases until the maximum pitch is reached. The contact may be arrested at any point, like the wick of an oil lamp.

A C Titan in New Size

The Champion Ignition Co., Flint, Mich., now is making the A C Titan plug in a long body. Metric size particularly adapted to foreign cars and aeroplane engines. After extensive tests in comparison with the best European makes, the Renault Co., maker of the French Renault car, has adopted it for regular equipment. This plug is furnished either with regular length of thread or with extension.

Guyer Rotary Valve

valve for four-cycle explosion engines has been invented by R. T. Guyer, Elkhart, Ind. It employs a cone-shaped valve rotating at one-half engine speed in contact with a cone seat formed on the inner surface of the cylinder head. The valve disk has one opening which registers, at the proper time, with fuel intake and exhaust ports in the head and keeps them sealed during compression and working stroke.

The valve is self-grinding and self-packing and if properly lubricated will maintain a perfect fit throughout the life of the motor, it is said. On multi-cylinder motors the valve is shaft driven through spiral gears and mechanical noise is eliminated because of the absence of cams, push rods, rocker arms.

Pressure on the valve automatically is relieved by cutting channels on the valve seat, these channels extending past the edge of the valve and leading gas from the combustion chamber to the back of the valve so that even at the instant of ignition when the cylinder pressure reaches a high point the valve practically floats on a cushion of gas.